PREPARED FOR:
PACCAR Inc

BY:
Shannon & Wilson
400 N. 34th Street, Suite 100
Seattle, WA 98103

(206) 632-8020
www.shannonwilson.com

SAMPLING, ANALYSIS, AND QUALITY CONTROL PLAN

Compliance Monitoring Plan

8801 EAST MARGINAL WAY S, TUKWILA, WASHINGTON

Agreed Order No 6069

SHANNON & WILSON

March 15, 2021

Shannon & Wilson No: 21-1-12567-024

CONTENTS

CONTENTS

Attachments

ACRONYMS

°C	degrees Celsius
8801 property	upland portion of the 8801 site
8801 site	8801 East Marginal Way South site
ARI	Analytical Resources, Inc.
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CMP	Compliance Monitoring Plan
COC	chemicals of concern
cPAHs	carcinogenic polycyclic aromatic hydrocarbons
CUL	cleanup level
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
F&B	Friedman & Bruya, Inc.
HASP	Health and Safety Plan
HVOC	halogenated volatile organic compound
IDW	investigation-derived waste
mg/L	milligrams per liter
MS/MSD	matrix spike/matrix spike duplicate
NTUs	nephelometric turbidity units
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons-Diesel Extended
NWTPH-Gx	Northwest Total Petroleum Hydrocarbons-Gasoline Extended
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
PPE	personal protective equipment
RL	remediation level
QA/QC	quality assurance and quality control
SAQP	Sampling, Analysis, and Quality Control Plan
SSD	sub-slab depressurization
TCE	trichloroethene
TPH	total petroleum hydrocarbons
TPH-D	total petroleum hydrocarbons as diesel
TPH-G	total petroleum hydrocarbons as gasoline-range organics
TPH-O	total petroleum hydrocarbons as oil
VOA	volatile organic analyte
WAC	Washington Administrative Code

1 INTRODUCTION

This Sampling, Analysis, and Quality Control Plan (SAQP) has been prepared to detail field and laboratory procedures for the proposed activities outlined within the Compliance Monitoring Plan (CMP).

The proposed activities are to be conducted at the upland portion of the 8801 East Marginal Way South site in Tukwila, Washington (8801 site). The upland portion of the 8801 site is referred to as the 8801 property. A location map of the 8801 property is provided in the CMP Figure 1.

1.1 Scope of Work

The scope of work, as outlined in the CMP, consists of the following tasks and objectives:

- Remedial Excavations
  - Excavate soil in known hotspots to remove mass of chemicals of concern (COCs).
- Remedial Injections
  - Inject chemicals to stimulate enhanced reductive dechlorination in the volatile organic compound plume to remediate trichloroethene (TCE), vinyl chloride and total petroleum hydrocarbons (TPH) contamination, and
- Groundwater Investigation
  - Decommission 17 groundwater monitoring wells that are being impacted by construction or are no longer useable,
  - Install 14 new or replacement groundwater monitoring wells to allow performance and compliance monitoring, and
  - Conduct groundwater monitoring and sampling to show performance and compliance monitoring.
- Sub-Slab Vapor Investigation
  - Sample sub-slab vapor inside of the new warehouse building.

1.2 Project Contact Information

Key contact information for the proposed scope of work includes:

- Project Manager: Meg Strong, (206) 695-6787
- Project Coordinator: Ryan Peterson, (206) 695-6673
- Quality Assurance Manager: David Randall, (206)-695-6918

- Facility Representative: Bridget Fisher, (213) 330-6287
- Health and Safety Coordinator: Mindy Buxton (206) 695-6813
- Site Safety Officer: Christian Canfield, (206) 695-6716

Freemont Analytical Incorporated (Freemont) of Seattle, Washington, Friedman & Bruya, Inc. (F&B) of Seattle, Washington, NVL Laboratories, Inc. of Seattle, Washington, and ARI Laboratory of Tukwila, Washington (all Washington State Department of Ecology [Ecology]- and National Environmental Laboratories Accreditation Program-certified laboratories) will provide analytical testing services for the project. F&B will provide analytical testing for vapor samples. Freemont will provide analytical testing for soil samples. ARI will provide analytical testing for groundwater samples. NVL will provide analytical testing of lead air monitoring samples.

Mike Ridgeway - Freemont
3600 Freemont Avenue North
Seattle, WA 98103
Telephone: (206) 352-3790

Mr. Eric Young – F&B
3012 16th Avenue West
Seattle, WA 98119-2029
Telephone: (206) 285-8282

Mrs. Shaista Khan – NVL
4708 Aurora Ave N.
Seattle, WA 98103
Telephone: (888) 685-5227

Ms. Shelly Fishel - ARI
4611 S. 134th Place, Suite 100
Tukwila, WA 98168-3240
Telephone: (206) 695-6210

Select soil samples will also be submitted to the Shannon & Wilson Seattle Soils Laboratory, an American Association of State Highway and Transportation Officials Accreditation Program-accredited laboratory, for grain-size analysis.

Mr. Kerem Kalkay – Shannon & Wilson Seattle Soils Laboratory
400 N. 34th Street, Suite 100
Seattle, WA 98103
Telephone: (206) 695-6695

1.3 Organization

The remainder of this SAQP is broken into eight sections. Section 2 outlines preparation activities to be completed prior to field sampling events. Section 3 outlines soil investigation and sampling. Groundwater investigation activities are outlined within Section 4. Section 5 describes the field quality assurance and quality control (QA/QC) procedures, including sample handling, QA/QC samples, and equipment decontamination. Investigation-derived waste (IDW) management is discussed within Section 6, and health and safety

considerations are provided in Section 7. Relevant field forms are provided in Attachment 1.

2 PREPARATION

2.1 Site Access Requirements and Notifications

The Shannon & Wilson team staff will coordinate with a representative from CenterPoint's (the property owner) or tenant's representative, as relevant at the time of site work, in advance of mobilizing to the 8801 property. We will also notify Ecology either in advance of the work or by providing a schedule detailing the timeline of the work.

2.2 Utility Clearance

Utilities will be cleared prior to starting excavations or drilling. The locations will be marked in advance of the drilling activities, and the public One-Call utility check system will be notified. Applied Professional Services, Inc., a private utility clearance contractor, will clear each location. Drilling locations may be moved slightly due to discovered utilities.

2.3 Equipment Preparation

Necessary field equipment and documentation materials will be prepared prior to undertaking work. A checklist of equipment required during sampling activities will be prepared and checked each morning. Laboratory-supplied sample containers will be inspected for the proper preservative and inventoried to ensure adequate containers are available.

Meters will be calibrated at the start of each work period or prior to arrival on the 8801 property. Calibration will be valid for field conditions and will be completed in accordance with manufacturer recommendations. Calibration measurements will be documented in the field activity log for the project. Calibrations will be checked approximately every four hours thereafter and will be recalibrated, as necessary, during the work period. At the end of each day, all meters will be checked against their last calibration to document any drift that may have occurred.

A field sampling tablet, in conjunction with a field label printer, will be used during groundwater sampling activities. The tablet will be charged and setup prior to the start of each work period. Tablet setup will include pre-loading the tablet with the wells to be sampled, the analyses to be performed, and the bottles (quantity, type, size, and preservation information) needed for each sample.

3 SOIL-RELATED WORK

A Shannon & Wilson representative will be on site to locate excavations, observe utility locating activities, observe excavation activities, and prepare descriptive logs of the materials encountered. Agreed Order No. 6069 requires that any geologic work be completed under the supervision of a geologist or engineer licensed in the State of Washington. Direct-push work and remedial excavations will be overseen by a licensed engineer or geologist.

3.1 Pre-Excavation Base Sampling

In excavations where the base is likely to be below groundwater, push-probe borings will be used to collect base confirmation samples in advance of the excavation work. Borings are being used to collect base samples because most of the excavations that extend below the water table are within the tidal zone and will not be completely dewatered due to the constant tidal influx. Samples from borings can be used to target the proposed excavation depth more accurately than samples collected from an open excavation. Where borings are used to collect pre-excavation base confirmation samples, borings will be placed in locations where the maximum excavation depth is expected to be achieved. Soil samples will be collected from the borings at the targeted excavation depth, and one-foot above and one-foot below the targeted depth. The sample collected from the targeted depth will be analyzed first for the COCs applicable to the excavation area. If the COCs in the sample are below the applicable CUL or RL, then the shallower sample will be analyzed, and if any of the COCs in the sample are above the applicable CUL or RL then the deeper sample will be analyzed. The shallowest sample in which all relevant COCs are below the applicable CUL or RL will constitute the confirmation base sample for the excavation.

3.2 Remedial Excavations Sampling

Remedial excavation performance sampling is described in the CMP. Soil samples will be taken directly from the bucket of the excavator. Excavation locations can be seen in Figure 4 of the CMP.

Confirmation soil samples will be collected from the sidewalls and bottoms of each excavation area. In shallow excavations above the groundwater table, the four sidewalls and the bottom will be sampled. Generally, samples will be collected on 20-foot centers from the sidewalls and bottom of each excavation area with a minimum of one sample collected from each sidewall and base as outlined below:

- If the final excavation depth is 4 feet or less, a minimum of one sample from each sidewall will be collected within the contaminant horizon identified during previous investigation or as noted during field observation.
- If the final excavation depth exceeds 4 feet, a minimum of one sample from each sidewall will be collected from the center (or within the contaminant horizon) of each 3-foot-thick (or portion of each) vertical layer. The thickness of the individual sample layers may be reduced to allow for more even sample distribution or accommodate field observations. For example, two samples from each sidewall when the excavation depth is 8 feet.
- Regardless of the total depth of the excavation, one sample from each fill layer observed in the excavation will be collected. This may require collection of additional sidewall samples.
- Bottom samples will be collected on a 20-foot grid in excavations where groundwater is not encountered.
- When groundwater is encountered during the excavation, the lowermost sidewall sample will be assumed to represent conditions at the water table, except where pre-excavation base samples have been previously collected.
- In excavations where the base is likely to be below groundwater, borings will be used to collect base confirmation samples in advance of the excavation work. Borings are being used to collect base samples because most of the excavations that extend below the water table are within the tidal zone and will not be completely dewatered due to the constant tidal influx and borings can be used to target the proposed excavation depth more accurately than can be collected when the base is water saturated. The borings will be completed within months of the excavations being completed.

Each excavation area will have a unique sampling suite dependent upon the COC present in the area. CMP Figure 4 shows excavation locations. CMP Table 7 details soil sampling by each excavation area. The goal of the excavations is to remove soil containing excavation-specific COCs at concentrations above remediation levels (RLs) (except in Area 5 for cadmium and chromium and Areas 7 and 8 for gasoline-range hydrocarbons), and sample results will be used to extend the excavation if one or more excavation-specific COCs that exceed the RL are identified. The list below details the excavation-specific COCs for each area. Samples collected will be analyzed for the COCs previously documented in that location as follows:

Area 1 - Northern Property Boundary: This remedial excavation is designed to address TCE in shallow soil in the unsaturated zone. The excavation will be protective of groundwater by removing soil that has the potential to leach TCE into the groundwater table. Soil is proposed to be excavated to a depth of approximately 4 feet bgs, but the excavation may be extended to groundwater to allow for additional removal of TCE-

impacted soil if the base contains obvious visual or olfactory indications of elevated concentrations of TCE. Samples will be collected from the sidewalls and the base of the excavation, unless the base of the excavation is in contact with groundwater, in which case no base sample will be collected. The samples will be analyzed for TCE, PCE, and vinyl chloride.

Area 2 - H4 Area and Vicinity: This remedial excavation is designed to address total cPAHs that exceed the TEQ in shallow soil (1.5 feet bgs) in the unsaturated zone. Soil will be excavated to a depth of approximately 2.5 feet bgs. Samples will be collected from the sidewalls and the base of the excavation, unless the base of the excavation is in contact with groundwater, in which case no base sample will be collected. The east sidewall may not be sampled unless signs of potential contamination are noted as that is backfill material from the previous H4 excavation. The samples will be analyzed for cPAHs.

Area 3 - E7 and Vicinity: This remedial excavation is designed to address PCBs, copper, and gasoline-range hydrocarbons in shallow soil (2 to 3 feet bgs) in the unsaturated zone. The initially targeted depth of the excavation is approximately 6 feet bgs. The area surrounding DG11-11 and DG11-12 will first be excavated to 6 feet bgs. The excavation will be stepped out based on visually obvious indications of contamination, such as beige and green putty like material that was encountered in a remedial excavation of similar COCs on the south adjacent property. Samples will be collected from the sidewalls and base of the excavation and analyzed for PCBs, copper, and gasoline-range hydrocarbons.

Area 4 - DG11-1 and Vicinity: This remedial excavation is designed to address PCBs and dioxins/furans in shallow soil (3 to 4 feet bgs) in the unsaturated soil and copper in unsaturated and potentially saturated soil (up to 8 feet bgs). Based on the pre- excavation base sampling conducted in February 2021, the excavation will extend to a maximum depth of 8 feet bgs. Samples will be collected from the east, north, and south sidewalls of the excavation and analyzed for PCBs and copper. The west sidewall of the excavation will not be sampled unless signs of potential contamination are noted because the soil in this location consists of clean material imported to backfill a former stormwater vault excavation. And the base of the excavation will not be sampled because confirmation base samples were collected in February 2021.

Area 5 - Southwest Storage Area: This remedial excavation is designed to address lead, arsenic, cadmium, and chromium in shallow soil (1 to 5 feet bgs) in the unsaturated zone and PCBs and lead in deeper soil (6 to 11 feet bgs) in the unsaturated and saturated zone. Based on the pre- excavation base sampling conducted in February 2021, the excavation base will be 11 feet bgs except at the location of MW-43A where the excavation will extend to 12 feet bgs. Samples will be collected from the north, east, and west sidewalls of the

excavation in shallow soil (1 to 5 feet bgs) and analyzed for lead, arsenic, cadmium, and chromium. Samples will be collected from the north, east, and west sidewalls of the excavation in deeper soil (5 feet to 11 ft bgs) except where below the groundwater table, and analyzed for PCBs and lead. The south sidewall of the excavation will not be sampled unless signs of potential contamination are noted because the soil in this location consists of clean material imported to backfill a former stormwater vault excavation. The base of the excavation will not be sampled because confirmation base samples were collected in February 2021.

Area 6 - SFA-S15-3: This remedial excavation is designed to address arsenic in unsaturated soil at one sample location. The excavation is expected to extend to a depth of approximately 6 feet bgs. Samples will be collected from the sidewalls and base of the excavation. The samples will be analyzed for arsenic.

Area 7 - FWW-1: This remedial excavation is designed to address gasoline-range hydrocarbons in shallow soil at one sample location. This excavation is expected to extend to a depth of 9 feet bgs and into the groundwater. Samples will be collected from the sidewalls of the excavation and analyzed for gasoline-range hydrocarbons. The base of the excavation will not be sampled because a confirmation base sample was collected in February 2021.

Area 8 - A1: This remedial excavation is designed to address gasoline-range hydrocarbons in saturated soil (7 to 12 feet bgs). Based on the pre- excavation base sampling conducted in February 2021, the excavation will extend to a maximum depth of 10 feet bgs. Samples will be collected from the sidewalls of the excavation and analyzed for gasoline-range hydrocarbons. The base of the excavation will not be sampled because a sample was collected from this depth in February 2021. Vertical expansion of the Area 8 excavation is not possible due to existing infrastructure, and laterally expansion also is constrained by existing infrastructure. For this reason, this excavation is likely not to be expanded as discussed in the relevant EDR.

3.3 Imported Fill Sampling

Imported fill will be tested for geotechnical properties to confirm its structural integrity for future site development and analyzed for select COCs. Soil will be tested to ensure that no PCBs or TPH are present at detectable levels and that cPAHs, lead, arsenic, and copper do not exceed the RL. It is assumed that a minimum of one sample from every type of material or every 5,000 tons will be tested. Samples failing geotechnical performance criteria or showing exceedance of any analyte will be rejected. Soil performance monitoring is detailed in the CMP Table 7.

Compaction testing of the fill will also be performed. The compacted fill will be tested so that a minimum of 95% of the maximum dry density, as determined by ASTM D6938, is achieved. The moisture content will be monitored during site placement and compaction.

3.4 Soil Sample Collection

Field personnel will collect soil samples by first donning a new pair of disposable nitrile gloves. New disposable steel spoons will be used to transfer soil from the excavator bucket or sample sleeve to the appropriate laboratory-supplied sample containers. Samples for volatile analyses will be collected using disposable syringes into methanol-preserved vials or pre-tared vials in accordance with U.S. Environmental Protection Agency (EPA) Method 5035. Once filled, the sample containers will be placed in a cooler with blue ice to maintain the samples within the acceptable temperature range of between 0 degree Celsius (°C) and 6°C. The samples will be transported under standard chain-of-custody procedures to ARI. Sample handling and field QA sample collection procedures are outlined within Section 5. Analytical limits of detection are presented in Attachment 4.

The following analyses will be completed as relevant and in accordance with the sample schedule in Table 7 of the CMP:

- Total petroleum hydrocarbons as gasoline (TPH-G) by Method Northwest Total Petroleum Hydrocarbon-Gasoline Extended (NWTPH-Gx);
- TPH as diesel and oil (TPH-D and TPH-O) by Method Northwest Total Petroleum Hydrocarbons-Diesel Extended (NWTPH-Dx);
- Halogenated volatile organic compound (HVOCs), including PCE, TCE, and vinyl chloride by EPA Method 8260C;
- cPAHs by EPA Method 8270D selected ion monitoring;
- PCBs as aroclors by EPA Method 8082A;
- Resource Conservation and Recovery Act 8 Metals, including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver by EPA Methods 6020 and 200.8. Additional metals analysis may include copper, nickel, and zinc; and
- Dioxins/Furans by EPA Method 1613B.

4 GROUNDWATER MONITORING WELLS

Many of the existing monitoring wells will be decommissioned and new monitoring wells installed after completion of CenterPoint's construction activities. New and existing monitoring wells will be sampled.

4.1 Monitoring Well Decommissioning

Each existing monitoring well, except for the compliance wells along the shoreline, are to be decommissioned. CMP Table 6 provides decommissioning rationale, and CMP Figure 2 shows the locations of wells to be decommissioned.

Wells will be decommissioned in accordance with Washington Administrative Code (WAC) 173-160-460. At each well to be decommissioned, the well screen, and casing will be sliced, pulled, or over-drilled (dependent on the condition of the well and availability of Ecology-held logs). The casing will be sealed with bentonite, bentonite slurry, neat cement grout, or neat cement. The surface monument will be removed, and the casing will be cut below the level of the former monument. Concrete may be used to fill the void created by removing the monument, and the ground surface will be patched to replicate nearby surface conditions (unless undertaken in conjunction with re-development activities). A notice of intent and decommissioning log will be provided to Ecology for each well decommissioned.

4.2 Monitoring Well Installation

A total of 14 monitoring wells will be installed using auger drilling methods. Soil samples will not be collected from the borings. Monitoring wells will be screened across the water table at depth intervals ranging from 5 to 25 feet bgs. Screened interval depths may be adjusted based on field conditions and are expected to be between 5 to 15 feet long. A Shannon & Wilson representative will be on site to observe drilling activities, log soil, and select screened intervals for the monitoring wells. Well construction logs will be completed for each well (Attachment 1). The wells will be completed to conform with the State of Washington standards.

4.3 Monitoring Well Development

New monitoring wells will be developed after completed installation. Development will be completed using a pump-and-surge method with a surge block and submersible pump. Groundwater quality parameters, including conductivity, pH, turbidity, and temperature, will be measured periodically during development. Development will be considered complete when the measured turbidity is below 5 nephelometric turbidity units (NTUs), and the water becomes clear, once six well volumes have been removed, or at a maximum of four hours. Water levels, amount of water removed, observations of the discharge water, and turbidity measurements will be recorded on a Well Development Log (Attachment 1).

4.4 Groundwater Monitoring and Sampling

Wells selected for performance and compliance monitoring are described in Sections 5.2 and 5.3 of the CMP. Tables 6 and 7 of the CMP details the analytical suite to be completed at each monitoring well.

4.4.1 Groundwater Sample Collection

Groundwater samples will be obtained from monitoring wells in accordance with the below procedure. Groundwater samples will be collected using low-flow methods and will utilize a peristaltic pump. If the well to be sampled is a newly installed well, at least 24 hours will pass between finishing development and beginning groundwater sampling. Wells impacted by the tide will be sampled during or near low tide. The following procedure outlines groundwater sample collection:

1. Remove well cap and allow the pressure in the well and atmospheric pressure to equilibrate for at least three minutes.
2. Measure depth to water to the closest 0.01 foot from a marked location on the well casing or the northern rim of the casing if no marking exists. Record the depth and measuring location on the field data sheet.
3. Insert tubing into the peristaltic pump system. If samples are to be analyzed for PCB congener homologs, use thin-walled 0.25-inch-outside-diameter copper tubing and platinum-cured silicone tubing. Otherwise, standard polyethylene tubing and size 15 silicone tubing will be used. Lower the end of the peristaltic tubing into the middle of the water column. Connect the Horiba U-52 (or similar) into the system to allow collection of water quality data.
4. Turn on the pump and adjust the flowrate to be between 145 and 300 milliliters per minute. Reduce flow to keep drawdown to less than 0.3 foot. Purge into a 5-gallon bucket or similar.
5. Record water quality measurements every 3 to 5 minutes. Parameters to be recorded include temperature, pH, specific conductance, salinity, dissolved oxygen, oxidation-reduction potential, and turbidity.
6. Water quality will be considered stable when three readings of parameters are sequentially within the following ranges:
   - ± 0.1 pH units
   - ± 5% electrical conductivity (milli-Siemens per centimeter)
   - ± 15 millivolts oxidation-reduction potential
   - ± 10% turbidity NTUs or < 5 NTUs, with a goal of <50 NTUs.
   - ± 10% dissolved oxygen (mg/L), or <0.5 mg/L

- ± 1 degrees Centigrade

7. If water quality parameters do not stabilize after three well volumes have been purged, the purged volume will be considered sufficient to begin sampling.
8. Sample directly from pump discharge tubing into laboratory-supplied glassware complete with identifying labels. Sample in order of the most to least volatile COC. Reduce the pump flowrate for collection of the volatile organic compound samples to avoid creating bubbles in the collected sample. Once collected, place the samples in a cooler with blue ice.

If the well is purged dry before the groundwater is considered stable, the well will be allowed to recharge to a point sufficient to allow sampling. Samples will be collected following the well recharging.

4.4.2 Selected Analytical Analysis

Upon completion of purging and parameter stabilization, samples will be collected from the discharge end of the pump tubing into the laboratory-supplied containers.

Sample containers will be filled in order from most to least volatile in accordance with the sample schedule presented in CMP Tables 4 and 5. Sample handling and field QA sample collection procedures are outlined within Section 5.

Volatile organic analyte (VOA) vials will be filled by allowing the sample water to pour down the inside wall of the vials without splashing onto the base. VOAs will be filled to eliminate headspace, and the seal/lid will be secured. Samples for dissolved metals analysis will not be field-filtered or preserved. Upon receipt, the laboratory will filter and when necessary preserve the samples with nitric acid. We will request laboratory filtering on the COC.

After sample collection is complete, the equipment will be removed, the well cap will be replaced, and the monument lid will be secured. Samples will be submitted to an analytical laboratory. Analytical limits of detection are presented in Attachment 3. The following analyses may be completed in accordance with the sample schedule:

- TPH-G by NWTPH-Gx and BTEX by EPA Method 8260C;
- TPH-D and TPH-O by Method NWTPH-Dx;
- HVOCs, including 1,1-dichloroethene, cis-1,2-dichcloroethene, PCE, TCE, and vinyl chloride by EPA Method 8260C;
- cPAHs by EPA Method 8270D SIM;
- PCBs as aroclors by EPA Method 8082A;

- PCBs as congener homolog by EPA Method 1668 (2015); and
- Total and dissolved copper and arsenic by EPA Method 200.8.

The following natural attenuation parameters analysis will be completed:

- Ferrous iron by EPA Standard Method 3500,
- Nitrate and nitrite as nitrogen by EPA Method 300.0,
- Sulfate by EPA Method 300.0,
- Sulfite by EPA Standard Method 4500,
- Manganese ion by EPA Method 200.8, and
- Methane by RSK-175.

5 SUB-SLAB VAPOR SAMPLING

Sub-slab vapor sampling will be conducted to monitor sub-slab vapor beneath the new proposed building.

5.1 Sampling Port Installation

Sampling ports will be installed within the new proposed building as a part of the sub-slab depressurization (SSD) system. The SSD system is detailed in a separate Engineering Design Report.

5.2 Sub-Slab Vapor Sample Collection

Each quarter for two years following construction, five sub-slab vapor samples will be collected directly from the SSD system sampling ports. One duplicate sample will be obtained during each sampling event. The five sampling locations will be the same as those used for the baseline sample for the first two quarters. After the first two quarters, a randomly selected but spaced set of five points will be sampled until the CUL parameters are met.

Vapor samples will be collected using a SUMMA canister connected to the sampling port via a teflon tube. The negative pressure in the SUMMA canister will be recorded in advance of sampling commencing and sampling will cease when the vacuum gauge reads approximately 5 inches of mercury. The time the canister was opened and closed, and the final vacuum will be recorded on the monitoring log. It is anticipated that sampling will take approximately 10 to 15 minutes per location.

The barometric pressure and tide cycle will be recorded for the sampling date and time.

Upon completion of sample collection, the samples will be transported to an analytical laboratory for the following analysis:

- Halogenated VOCs by EPA Method TO-15.

6 FIELD QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) REQUIREMENTS

Field QA/QC procedures, discussed below, have been established to ensure that samples can be tracked from collection through analysis, evaluate the efficiency and reproducibility of sampling procedures, and ensure that sampling activities do not result in cross-contamination.

6.1 Sample Handling, Chain-of-Custody, and Transportation Procedures

Environmental samples collected during the project will be labeled, stored, and transported using standard Shannon & Wilson protocols. Samples will be collected in clean, laboratory-supplied containers. Sample container, preservation, and holding times are presented in Attachment 5. These protocols are summarized below.

6.1.1 Sample Labeling

Sample container labels will be completed immediately before or immediately following sample collection. At a minimum, container labels will include the following information:

- Date and time of collection,
- Location of the sample,
- Name or initials of sample collector,
- Unique sample identification,
- Analysis requested, and
- Chemical preservative used.

The established nomenclature for soil samples will be:

Site: Boring/Excavation
Name: Sample Depth-Date

For example, a soil sample collected from 5.5 feet bgs from boring B-2020 on February 1, 2020, would be identified as:

8801:B-2020:5.5-02012020

The established nomenclature for groundwater samples will be:

Well Name-Date

For example, a groundwater sample from well MW-53 collected on February 1, 2020, would be identified as:

MW-53-02012020

Duplicate samples will be labeled with a discrete well/boring name commencing at numeral 100. For example:

MW-100-02012020 or B-100:5.5-02012020

Equipment blanks will have the initials EB, will be numbered sequentially, and dated:

EB-1-02012020

Trip blanks will have the initials TB, will be numbered sequentially, and dated:

TB-1-02012020

Matrix spike/matrix spike duplicate (MS/MSD) samples (water only) will be identified with the initials MS/MSD, with the identification of the well from which it was collected and dated. For example, an MS/MSD sample collected from MW-43 on February 1, 2020, would be labeled:

MS/MSD-MW-43-02012020

6.1.2 Chain of Custody

Once a sample is collected, it will be placed within a cooler with blue ice and will remain in the custody of the sampler until shipment, pick-up, or delivery to the laboratory, or until the sample possession is transferred to another party. Sample information will be entered onto a chain-of-custody form along with the requested analyses.

Upon transfer of sample possession to subsequent parties, the chain-of-custody form will be signed, and time stamped by the person(s) transferring and receiving custody of the sample container. Upon receipt of samples at the laboratory, the condition of the samples will be

recorded by the receiver. Chain-of-custody records will be included in the analytical report prepared by the laboratory.

Upon receipt of samples (which will be accompanied by a completed chain-of-custody record detailing requested analyses), the Laboratory Coordinator(s) or designee will:

- Verify all paperwork, chain-of-custody records, and similar documentation;
- Log in samples, assign unique laboratory sample numbers, and attach the numbers to the sample container(s);
- Perform any requested laboratory filtration and preservation;
- Open a project file and enter data into the file;
- Store samples in a refrigerated sample bank; and
- Email a record of the sample receipt and log-in form to the Shannon & Wilson Project Manager noting any problems with the samples.

6.1.3 Sample Transportation

Samples will be transported to the analytical laboratory within a cooler containing blue ice to ensure that samples are maintained within the appropriate temperature range (between 0°C and 6°C). Samples will be dropped at the laboratory by field personnel, picked up by the laboratory (or courier) at the Shannon & Wilson office, picked-up by the laboratory (or courier) at the 8801 property, or shipped directly to the laboratory from the Shannon & Wilson office. Carriers who are only involved in the transport of sealed coolers are not required to sign the chain of custody. However, shipping documents will be included in the project files if a carrier is used to transport the project samples.

6.2 Quality Assurance/Quality Control (QA/QC) Samples

QA/QC samples will be collected during the event to evaluate the reproducibility of the sampling technique and the subsequent laboratory analysis. These will include field duplicate samples, trip blank samples, equipment blank samples, MS/MSD samples, and temperature blank samples.

6.2.1 Field Duplicate Samples

Field duplicate samples are a second sample collected from a location. This sample is submitted to the laboratory with a "dummy" sample number and time as a regular sample. It is analyzed for the same suite as the original sample to allow for evaluation of the reproducibility of the sampling technique and the subsequent laboratory analysis. One field duplicate sample will be collected for every 20 groundwater and 20 soil samples. If fewer than 20 samples of soil or groundwater are collected, at least one field duplicate will be

sampled per sampling event for each media sampled. The field team will note in the field log where each duplicate sample was collected.

6.2.2 Trip Blank Samples

One trip blank will be submitted with each cooler containing soil or groundwater samples for volatile analytes (HVOCs or TPH-G/BTEX). Samples for volatile analyses will be grouped into as few coolers as possible to minimize trip blanks. The trip blank sample will be analyzed for the same set of volatile constituents that is contained within the cooler.

6.2.3 Equipment Blank Samples

Multiple equipment blank samples will be collected to evaluate potential contamination from the equipment used during sampling. This includes water used for decontamination, copper tubing, platinum-cured silicone tubing, polyethylene tubing, and standard silicone tubing.

Because some of the water screening levels for this project are significantly lower than drinking water standards, one equipment blank sample will be collected from the water source used to perform equipment decontamination. This sample will be collected in advance of the field activities to evaluate its adequacy for use. This sample will be collected by pouring the water used for the final rinse of decontamination directly into sampling containers, bypassing any tubing or sampling system.

During the field activities, equipment blank samples will be collected from the peristaltic pump sampling system and each tubing sampling system. Two equipment blank samples per sampling system will be taken to evaluate potential contributions from the tubing. The samples will be collected by running laboratory-distilled water through equipment tubing into laboratory-supplied containers. The laboratory-distilled water will also be analyzed separately by pouring laboratory-distilled water directly into sample containers. The equipment blanks will be analyzed for each contaminant that the system is used to sample for.

6.2.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples

MS/MSD samples are used by the laboratory to evaluate potential matrix interferences and evaluate analytical accuracy. One field MS/MSD sample will be collected for every 20 groundwater samples. Due to the high level of variability within soil, MS/MSD soil samples will not be collected.

6.2.5 Temperature Blank Samples

Temperature blank samples are used to determine whether the samples have been maintained within the appropriate temperature range. The samples are provided by the laboratory and are not analyzed for chemical constituents.

6.3 Equipment Decontamination

All non-disposable and non-dedicated sampling and monitoring equipment will be decontaminated prior to initial use, between sampling locations, and at the completion of the 8801 property-specific sampling. The procedure will include:

- Tap water initial rinse (if needed),
- Tap water and non-phosphate detergent (Alconox™) mixture wash,
- Tap water rinse, and
- Distilled water final rinse.

Additional decontamination steps may be incorporated as needed. Decontamination of personnel involved in sampling activities will be accomplished as described in a site-specific Health and Safety Plan (HASP).

7 INVESTIGATION-DERIVED WASTE (IDW) MANAGEMENT

IDW generated during this effort will include soil cuttings and groundwater purged from wells during development and sampling and decontamination water generated during probing and drilling activities. Soil, and water will be placed into separate drums, sealed, labeled, and temporarily stored on site.

Drums will be stored in or close to the air sparge/soil vapor extraction system building. Following receipt of analytical results and disposal facility acceptance, the IDW will be picked up by an appropriately licensed waste transporter and disposed of offsite at the appropriate accepting disposal facility.

Miscellaneous IDW consists of used personal protective equipment (PPE), disposable sampling equipment (spoons, tubing, etc.), and other wastes that originated from site activities. This IDW will be placed in doubled, heavy-duty plastic bags. The waste PPE and disposable sampling equipment will be disposed of in a dumpster at the Shannon & Wilson office.

8 HEALTH AND SAFETY

A site-specific HASP is provided in Appendix B of the CMP. The HASP was prepared consistent with the requirements of the Washington State Division of Occupational Safety and Health Hazardous Waste Operations Regulation (WAC 296-843). The HASP includes a description of the project team, the scope of work, site control, site hazard information, site hazard control, air monitoring, and emergency response. Information about the nearest hospital, including a map, is also provided.

ATTACHMENT 1: FIELD FORMS

Attachment 1

Field Forms

CONTENTS

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIELD LOG OF GEOPROBE

PROBING COMPANY/DRILLER: _____ JOB NO: _____ PROBE NO: _____

PROBE RIG EQUIPMENT: _____ JOB NAME: _____

PROBING METHOD: _____ LOGGED BY: _____

PROBE DIAM.: _____ TYP. RUN LENGTH: _____ LOCATION: _____ ELEV.: _____

WEATHER DURING DRILLING: _____ START DATE: _____ END DATE: _____

PROBE RUN AND SAMPLE DATA

TIME / DATE	RUN NO.	RUN	FROM / TO	LENGTH RECOVERED	FIELD CLASSIFICATION [Density/consistency, color, slightly, minor, MAJOR, then trace constituents; moisture; structure; other; (Geology) USCS classification.]	PID READING	SAMPLE NO.	SAMPLE DEPTH FROM / TO	SAMPLE PURPOSE OR COMMENT

SUMMARY FIELD LOG OF GEOPROBE

DEPTH FROM	DEPTH TO	USCS CLASSIF.	GENERALIZED SOIL DESCRIPTION FOR DRAFTED GINT LOG

COMMENTS (i.e. materials used, visitors, problems, etc.):

GROUNDWATER DATA

WATER DEPTH	TIME	DATE

SUMMARY OF TIME AND FOOTAGE

PROBE/SAMPLE _____ hrs. STANDBY: _____ hrs.

SETUP/CLEANUP: _____ hrs. DECON: _____ hrs.

OTHER: _____

BORING: _____ SHEET _____ OF _____

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

WELL / VWP CONSTRUCTION LOG

JOB NO. _____

BORING NO: _____ APPROX. GROUND ELEV: _____ ft.

INSPECTOR: _____ LOCATION: _____

INSTALL DATE: _____ (indicate if several installation dates)

ECOL. TAG NO: _____

TOTAL DRILLED DEPTH: _____ ft.

TOTAL SAMPL. DEPTH: _____ ft.

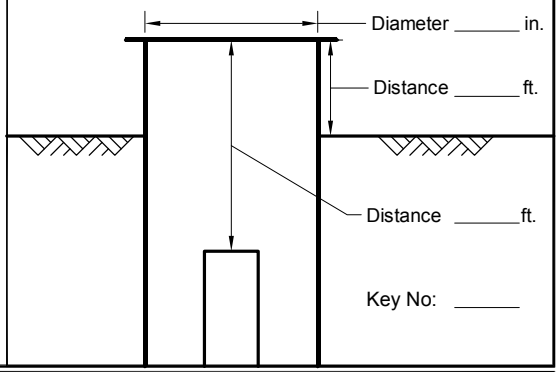
DRILLING METHOD: _____ (HSA, Mud Rotary, ect.)

DRILLING FLUID USED: _____ (Bentonite, Polymer, ect.)

BOREHOLE DIAMETER: _____ in.

DRILL MUD REMOVAL RMKS: _____

SURFACE MONUMENT DETAILS

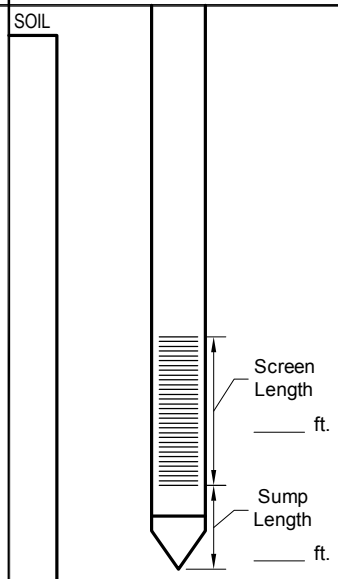


PIPE / INSTRUMENT DETAILS

DEPTH FROM	DEPTH TO	WELL / VWP NO.	SOLID	SLOTTED	DESCRIPTION (include OD/ID, slot width, pipe material, schedule, etc.)	VWP

SKETCH

SAND BENT. CHIPS BENT. GROUT BENT. CEMENT



NOT TO SCALE
Use Reverse Side if Desired

HOLE BACKFILL DETAILS

DEPTH FROM	DEPTH TO	FILTER	SEAL	DESCRIPTION (include seal or filter type, size, gINT code, etc.)	POUR	TREMIE

ADDITIONAL WELL DETAILS

CENTRALIZERS: ☐ Yes → Type: _____
☐ No → Depths: _____

CASING JOINTS: ☐ Threaded End Cap Type: _____
☐ Glued How Secured: _____

DEPTH TO WATER AFTER INSTALLATION: _____ ft.

INSTALLATION MATERIALS USED

SAND: _____ bags

CEMENT: _____ bags

BENTONITE POWDER: _____ bags

BENT. CHIPS/PELLETS: _____ bags

SLOTTED PVC: _____ ft.

BLANK PVC: _____ ft.

_____

VWP INITIALIZATION DETAILS

TRANSDUCER DEPTH: VWP #1 _____ ft.
VWP #2 _____ ft.

SER.# / PRESSURE RATING: VWP #1 _____ / _____ psi
VWP #2 _____ / _____ psi

VWP # and Reading Type	Zero Reading	Zero Temp	Date and Time of Reading	Readout Box S/N
#1 Unsaturated				
#1 Saturated				
#2 Unsaturated				
#2 Saturated				

ADDITIONAL COMMENTS: _____

_____

_____

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

WELL DEVELOPMENT LOG

JOB NO. _____

PAGE _____ OF _____

OWNER / LOCATION: _____ DATE: _____

WELL NO: _____ WEATHER: _____ PERSONNEL: _____

ECOLOGY TAG NO: _____ MEASURING POINT (MP): _____

LOCK NO. OR COMBINATION: _____ CASING DIA: _____ in. CASING: _____ gal / ft. TIME / PID HEADSPACE: _____ ppm

CASING STICKDOWN < OPEN MON. RIM: _____ ft. MON. HEIGHT: _____ ft. MONUMENT TYPE & DIA: _____ in.

SURGE BLOCK TYPE: _____ PRODUCT THICKNESS: _____ ft. PRODUCT MEASUREMENT METHOD: _____

TIME / STATIC WL < MP: _____ ft. DEVELOPMENT METHOD: (Bailer-SS, Teflon, HDPE) (Hand Waterra) (Powered Waterra) (Other_____)

TIME / VWP READING: _____ (Digits, Temp.) VWP READOUT BOX ID: _____ DECON. METHOD: _____

WELL DEPTH < MP: _____ ft. (Hard or Soft?) WATER COLUMN HEIGHT: _____ ft. VOLUME IN WELL: _____ gal.

WATER VOLUME ADDED? _____ (Tap or Distilled?) VOLUME PURGED: _____ gal. REPAIRS NEEDED? _____

MEANS OF SEDIMENT MEASUREMENT IN PURGE WATER: _____ SCREEN LENGTH: _____ ft.

FIELD PARAMETERS

START TIME/ WATER VOLUME ADDED, if any (gal)	END TIME	INTERVAL SURGED/ PURGED (ft > TD*)	TOTAL VOLUME PURGED (gal)	SEDIMENT THICKNESS (in or ml)	COLOR/ ODOR/ SHEEN?	FIELD PARAMETERS, if any (including units)		

*TD = Total Depth of Well

PURGE WATER DISPOSITION: _____ DRUM NUMBERS / LOCATION: _____

RELATIVE RECOVERY RATE: _____ (Rapid - Moderate - Slow) FINAL WELL DEPTH < MP: _____ ft. SHEEN / ODOR? _____

COMMENTS: _____

CASING CAP LEFT LOOSE OR TIGHT ? _____ WAS ALL SEDIMENT REMOVED? _____

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

JOB NO.: ______________________

Project: ____ Conducted by: ______________________

____

Weather: ______________________

WATER LEVEL MEASUREMENTS

Location ID	Date	Time	Measuring Point (MP)	Depth to Water from MP (feet)	VWP Reading		Comments (i.e. pressure change when opend, inaccesibility, etc.)
					Digits	˚ C	

Comments: ____

____

____

Checked By: ______________________ Date: ______________________

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

WATER SAMPLING LOG

JOB NO. _____
PAGE _____ OF _____

OWNER / LOCATION: _____ DATE: _____

WELL NO: _____ SAMPLE NO: _____ ECOLOGY TAG NO: _____ DUPLICATE NO: _____

WEATHER: _____ MS / MSD? Yes ☐ No ☐

WELL SITE CONDITIONS / MP DEFINITION: _____
(MP is typically the north PVC rim)

SAMPLING DATA

TIME STARTED: _____

PID HEAD SPACE: _____ ppm

MP DISTANCE ABOVE / BELOW GROUND SURFACE: _____ ft.

TOTAL DEPTH OF WELL BELOW MP: _____ ft.

DTW BELOW MP: _____ ft.

WATER COLUMN IN WELL: _____ ft.

CASING DIAMETER: _____ in.

GALLONS PER FOOT: _____

GALLONS IN WELL: _____

TIME PURGING STARTED: _____

LNAPL THICKNESS: _____ ft. Sample ☐

DNAPL THICKNESS: _____ ft. Sample ☐

SAMPLE CONTAINERS

Number	Size	Type	Pres.

FIELD PARAMETERS

GALLONS REMOVED	TEMP. (C°)	Eh (mV)	pH	COND. (µmhos / cm)	D.O. (mg / L)	TURBIDITY (NTU)	SALINITY (%)	TDS (g / L)	COLOR	TIME
Initial										
After Sampling										

EVACUATION METHOD: _____

PUMP INTAKE DEPTH (if applicable): _____

PURGE WATER DISPOSITION (e.g., drum #): _____

WATER QUALITY (e.g., sheen, odor): _____

WATER QUALITY METER(S) USED; CALIBRATION DATE / TIME: _____

SAMPLING METHOD: _____ SAMPLE TIME: _____

SAMPLING PERSONNEL: _____ DUPLICATE "TIME": _____

REMARKS (e.g., recovery rate): _____

TIME COMPLETED: _____

WELL CASING VOLUMES

Gal / ft 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46

VAPOR MONITORING LOG

SITE:		**INSTRUMENTS:**		**WEATHER CONDITIONS:**	
SAMPLER:		**CALIBRATION DATE:**		COVER:	
DATE:		**MAINTENANCE:**		TEMP:	

LOCATION ID	Time	Depth to Water (Feet)	BAROMETRIC PRESSURE (in Hg)	PUMP RUN TIME (s)	CH_4 (% VOL)	CO_2 (% VOL)	O_2 (% VOL)	COMMENTS/ OBSERVATIONS

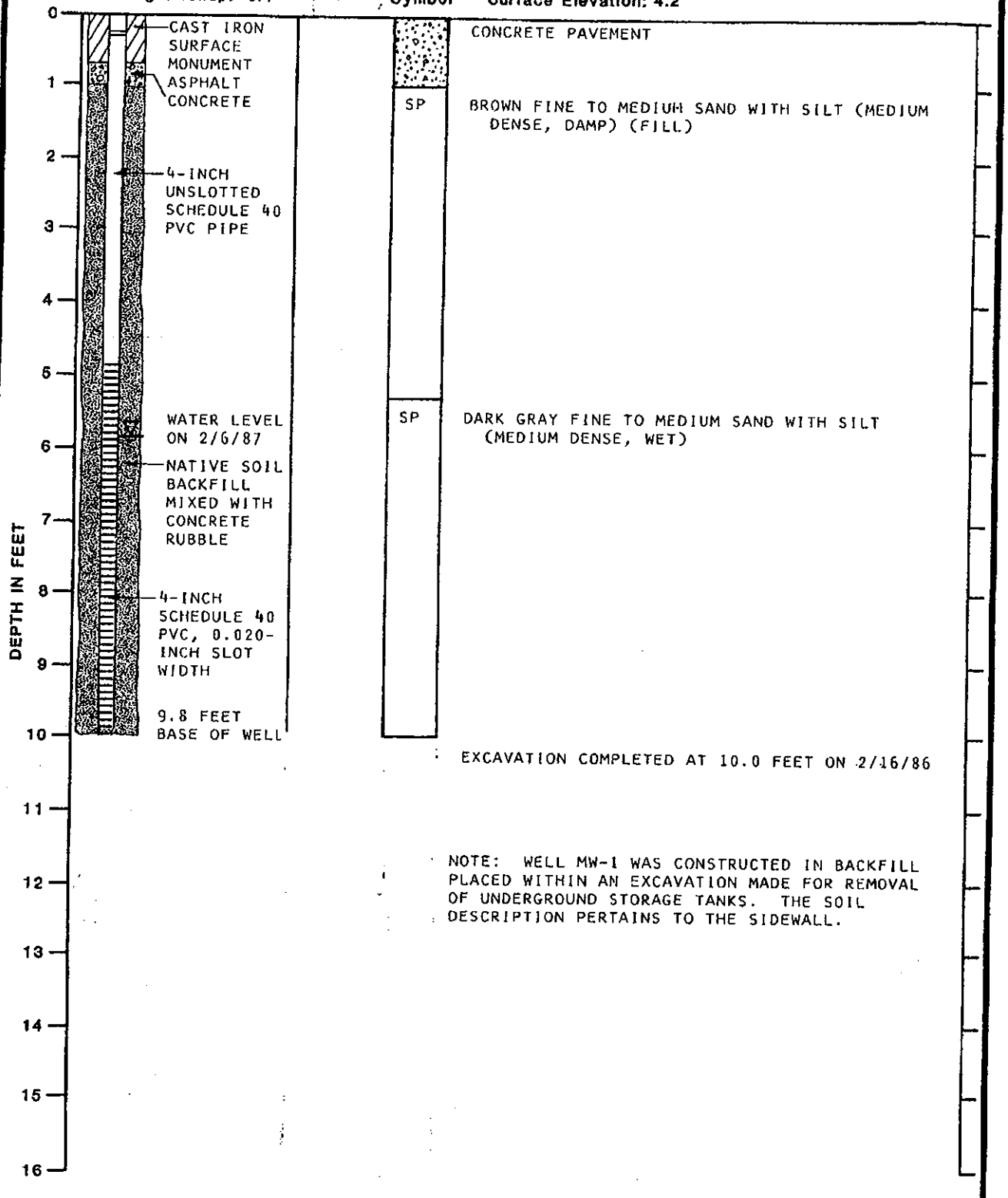
Notes:

ATTACHMENT 2: AVAILABLE BORING LOGS

Attachment 2

Available Boring Logs

MONITOR WELL NO. 1



Note: See Figure A-2 for Explanation of Symbols

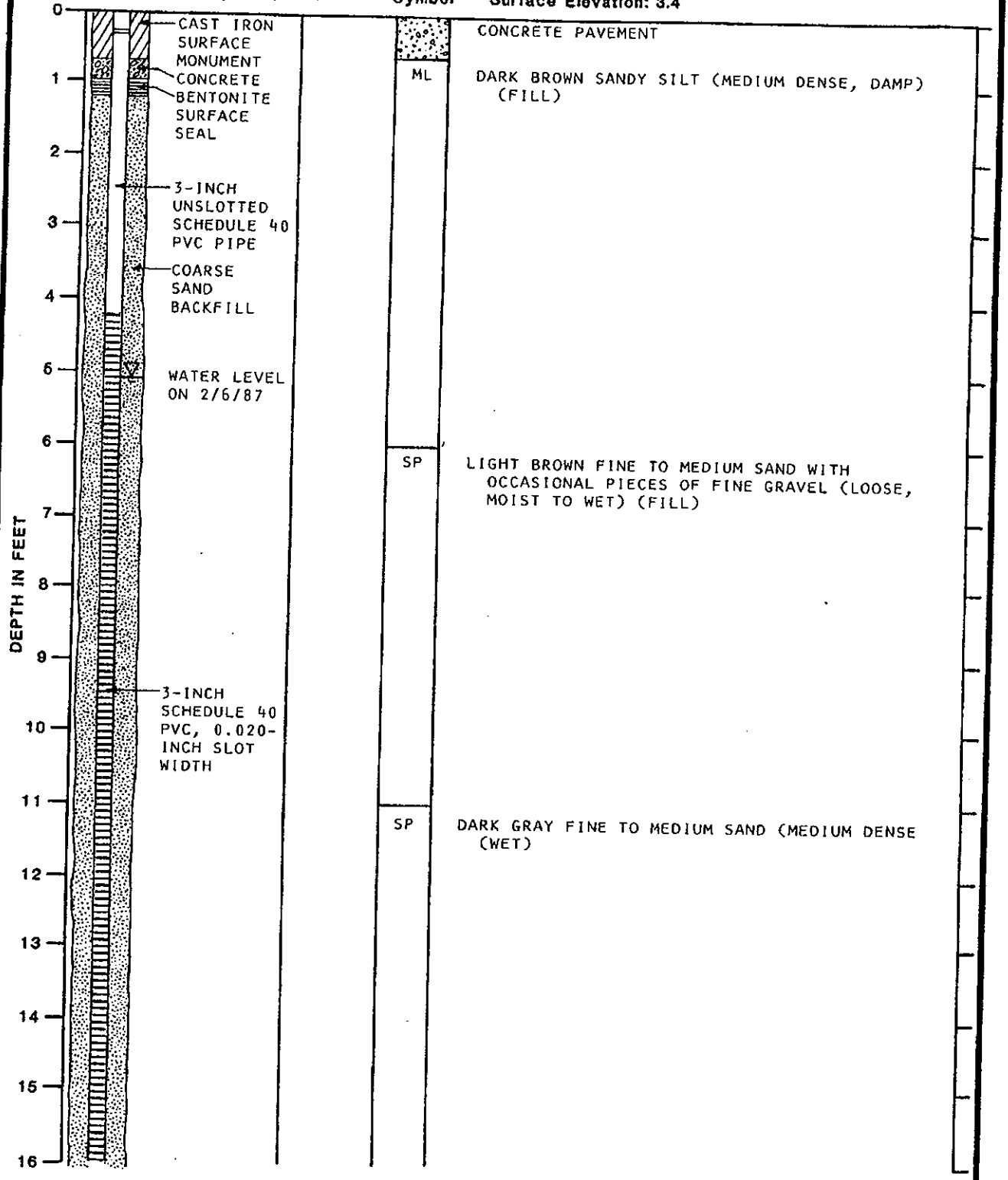
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-3

929-04 SEW:JAM:a1 2/6/87

MONITOR WELL NO. 2



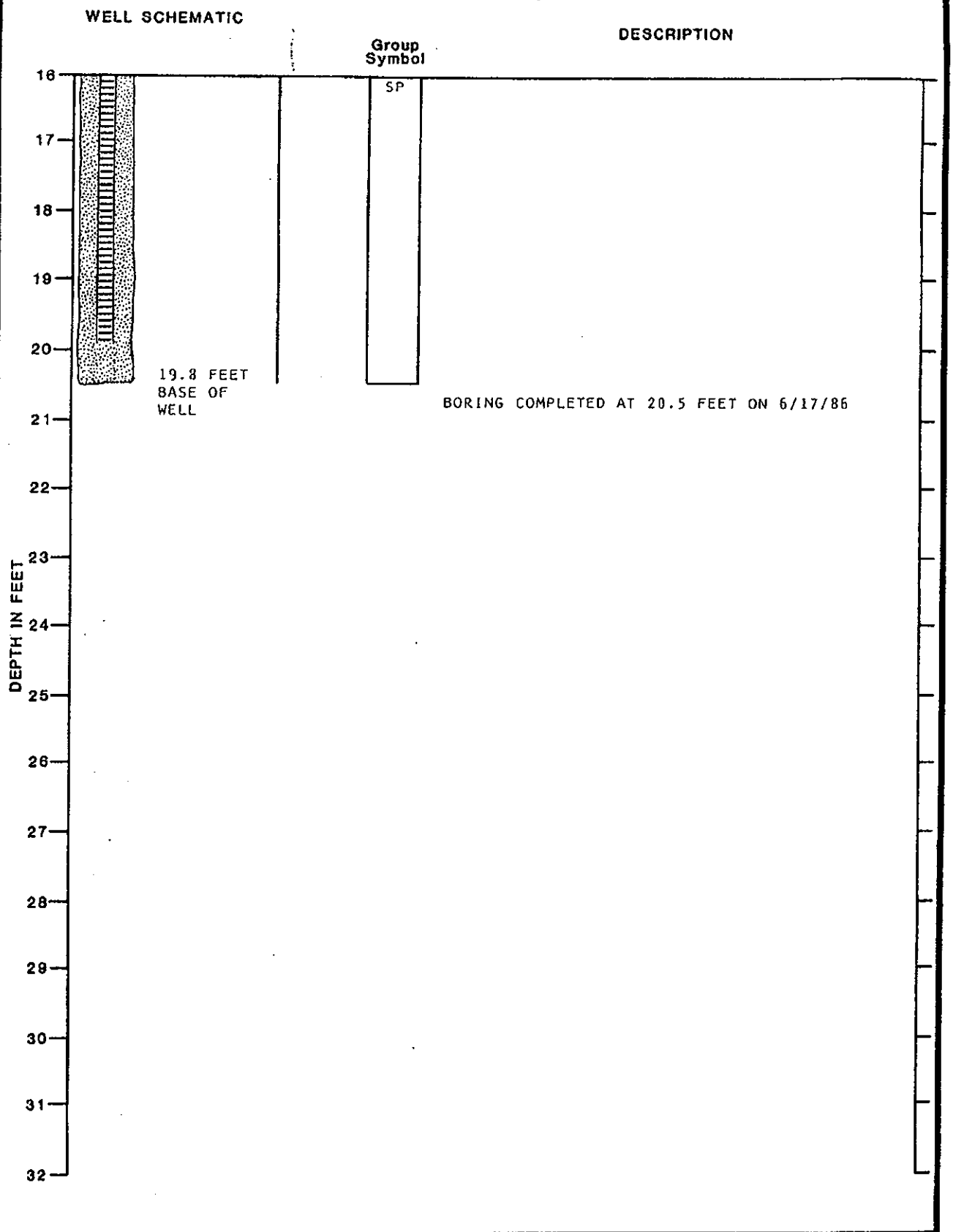
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-4A

929-04 SEW:JAM:el 2/6/87

MONITOR WELL NO. 2
(CONTINUED)



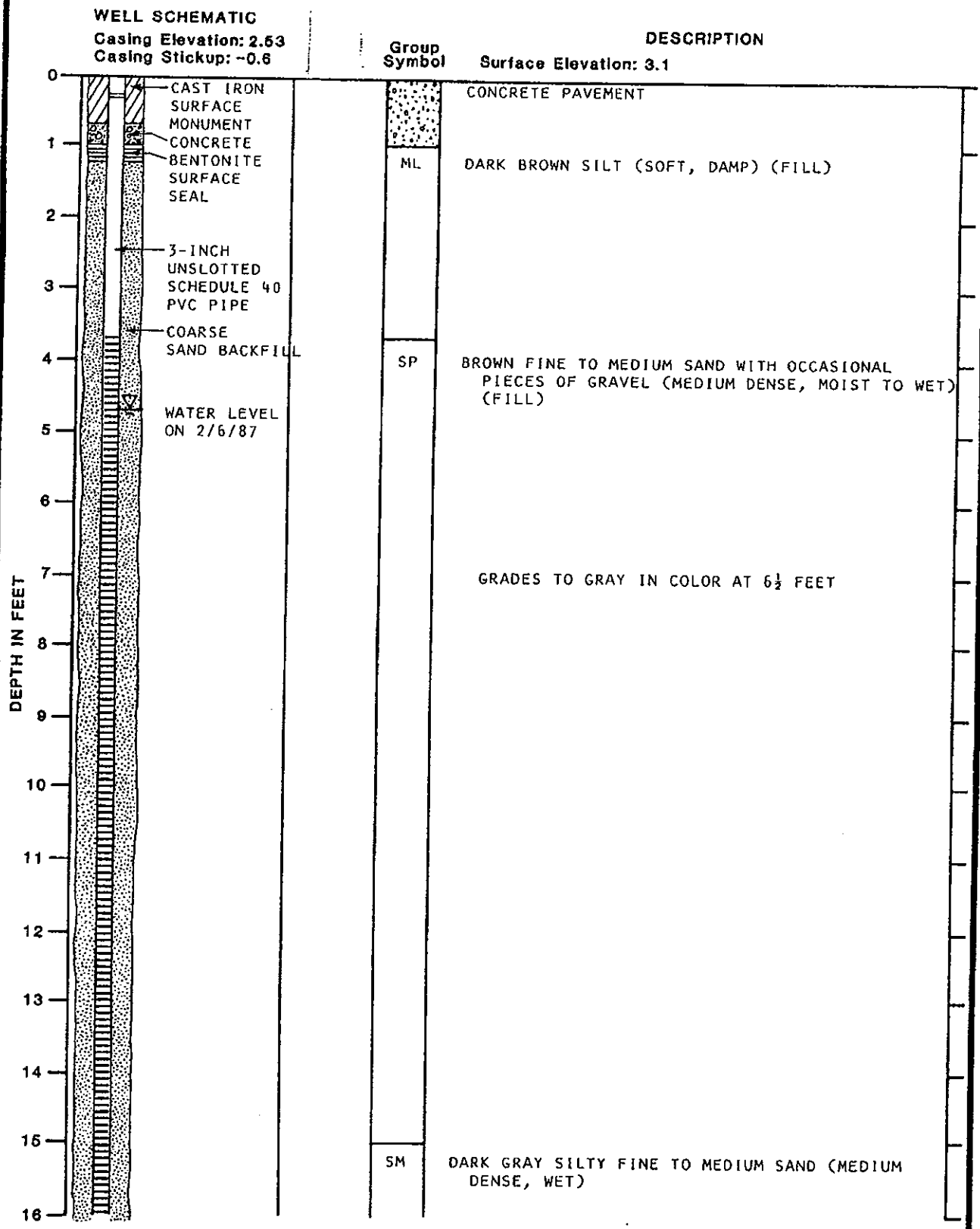
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-4B

929-04 SEW:JAM:el 2/6/87

MONITOR WELL NO. 3



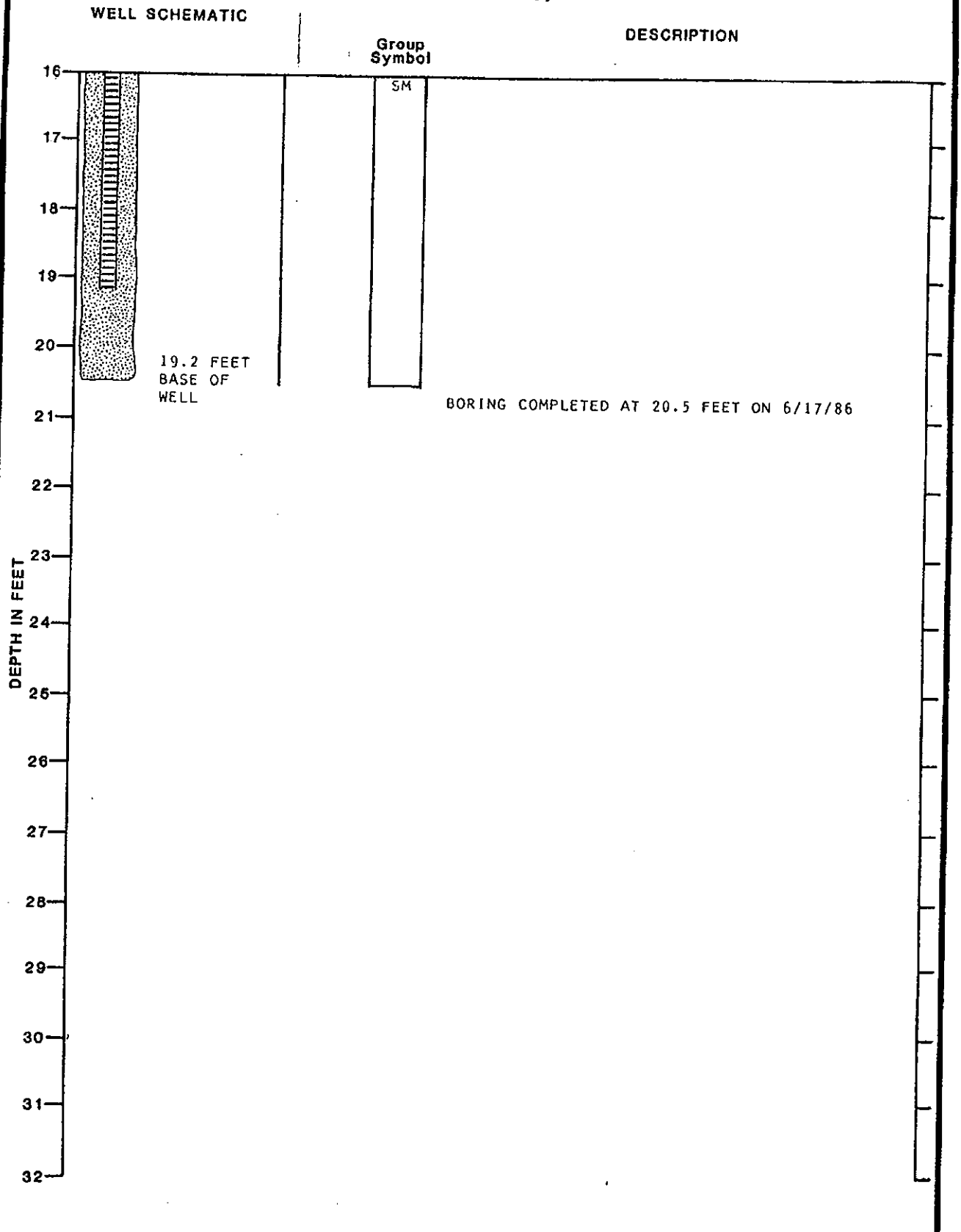
929-04 SEW:JAN:e1 2/6/87

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-5A

MONITOR WELL NO. 3
(CONTINUED)



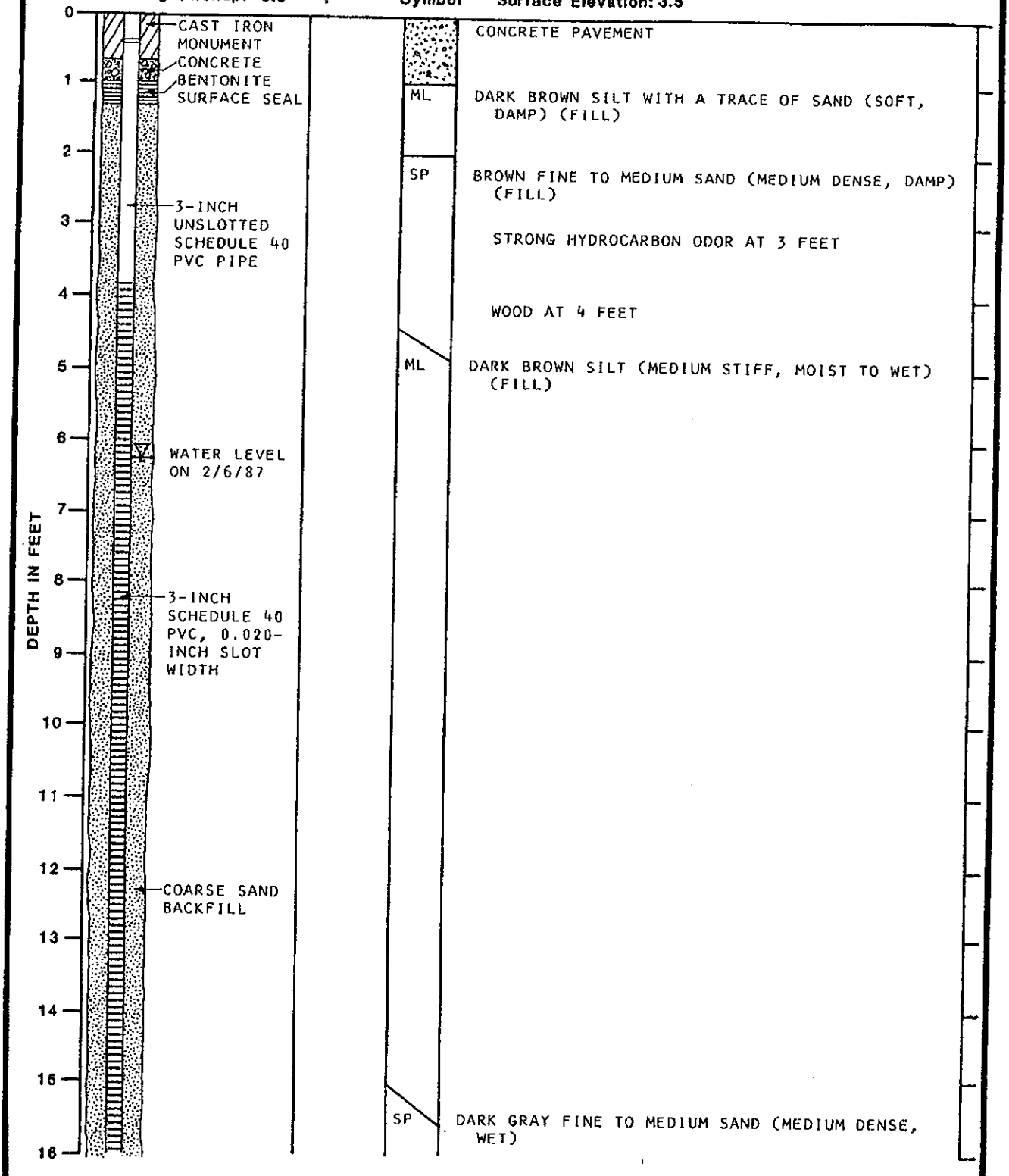
929-04 SEW:JAM:el 2/6/87

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-5B

MONITOR WELL NO. 4



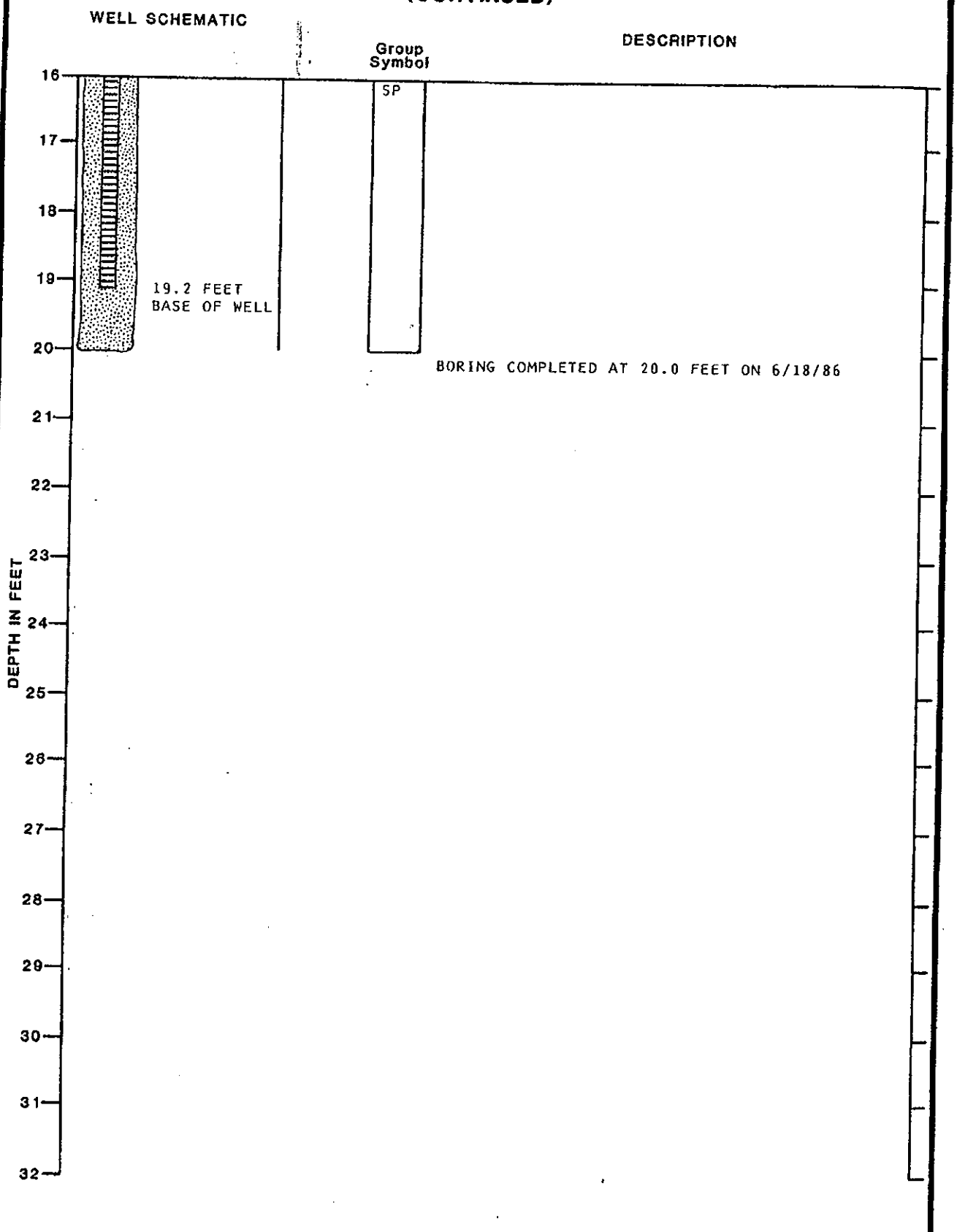
929-04 SEW:JAM:el 2/6/87

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-6A

MONITOR WELL NO. 4
(CONTINUED)



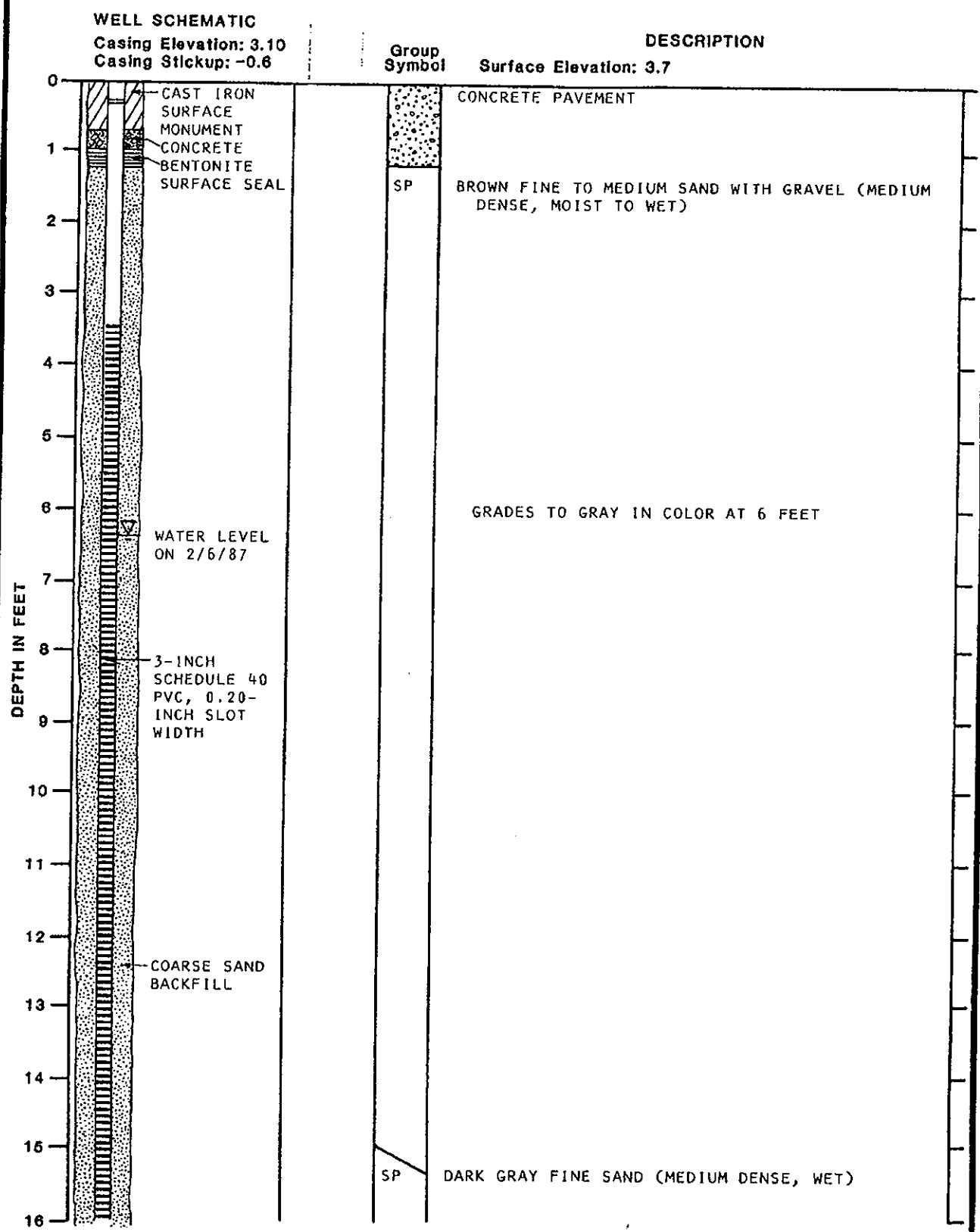
929-04 SEW:JAM:dmp:el 2/6/87

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-6B

MONITOR WELL NO. 5



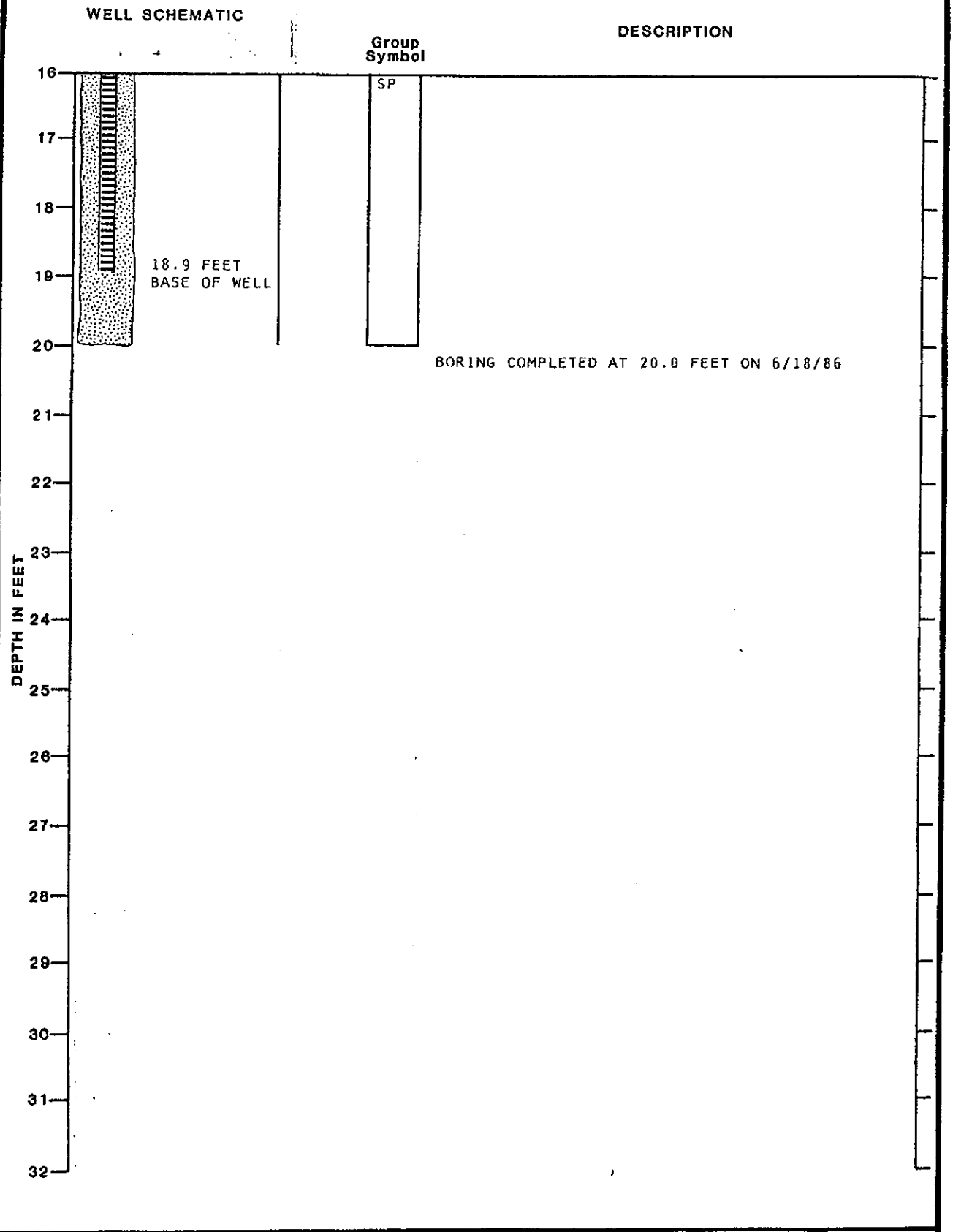
929-04 SEW:JAN:dmp:el 2/6/87

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-7A

MONITOR WELL NO. 5
(CONTINUED)



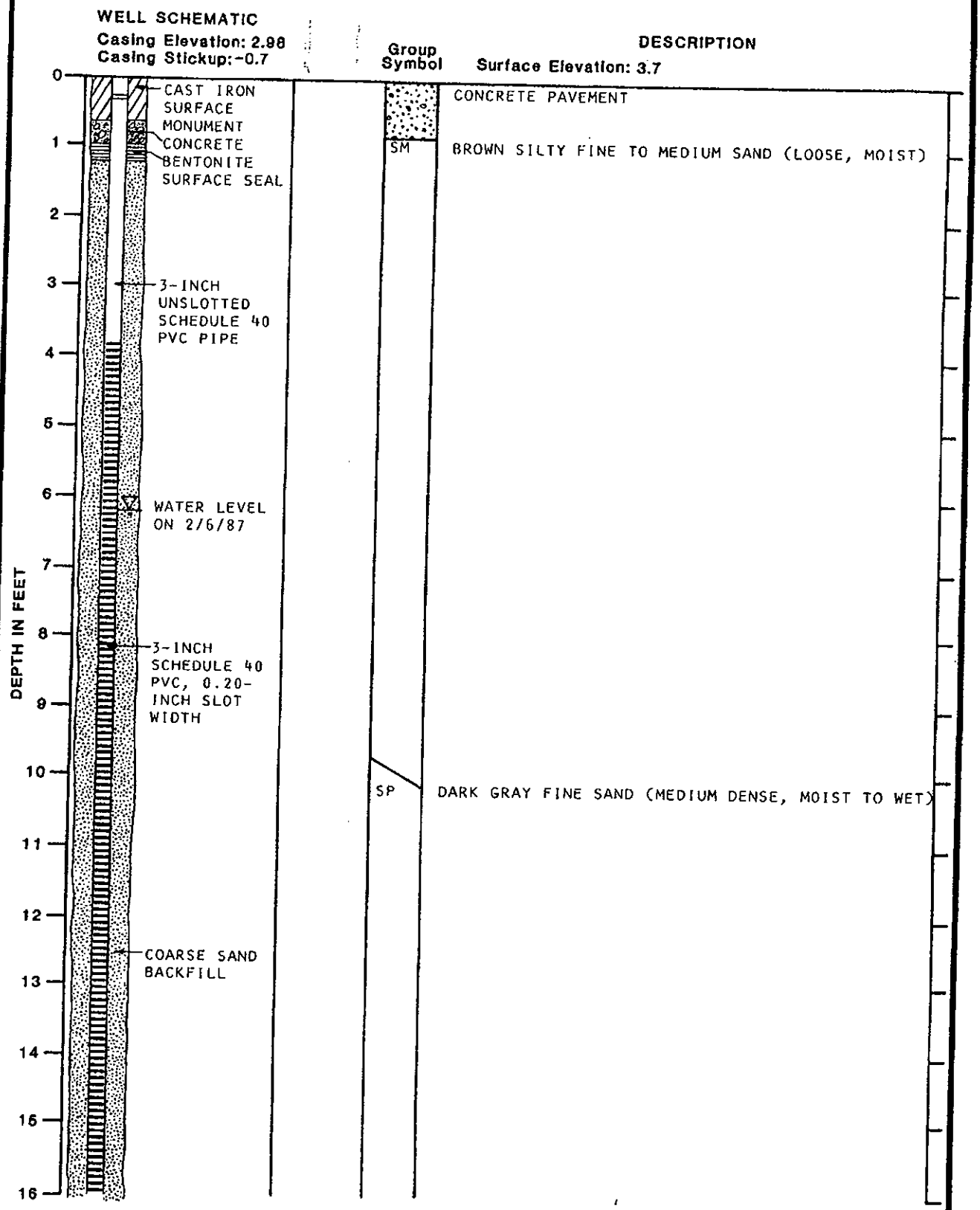
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-7B

929-04 SEW:JAM:dmp:el 2/6/87

MONITOR WELL NO. 6



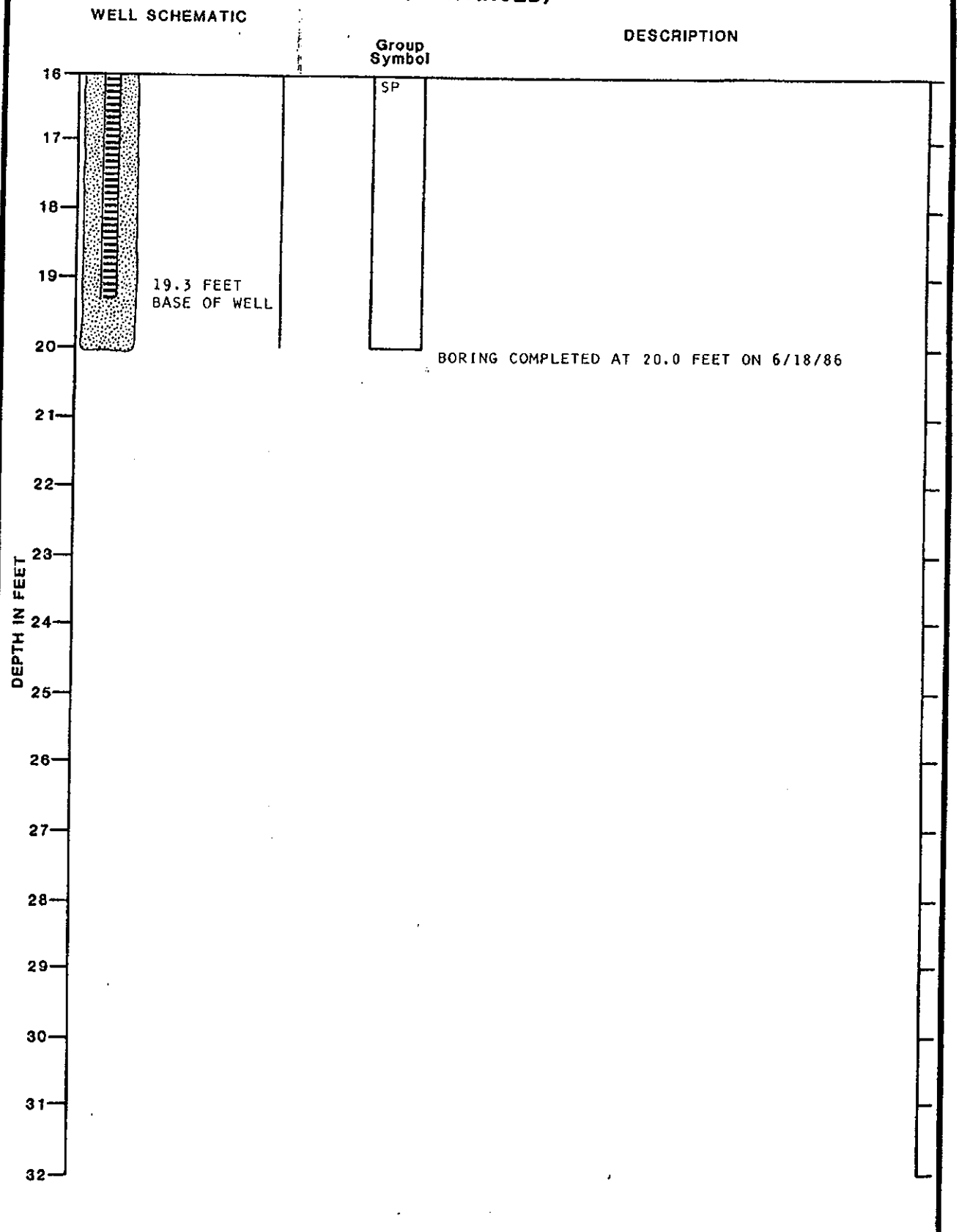
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-8A

929-04 SEW:JAM:dmp:e1 2/6/87

MONITOR WELL NO. 6
(CONTINUED)



929-04 SEW:JAN:dmp:e1 2/6/87

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-8B

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: MW-6A Replacement SFA		**Well Name**	MW-6A(R)
DRILLING COMPANY: Cascade Drilling, Inc.	DRILLER	**Project Name**	PACCAR
DRILLING METHOD(S): HSA	DRILL BIT(S) SIZE: 9 inches	**Project Number**	046001.00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: 2" Sched. 40 PVC Pipe	FROM 0 TO 5 FT.	DATE STARTED: 4/26/04	DATE COMPLETED: 4/26/04
SLOTTED CASING: 2" Sched. 40 PVC 0.010 Slot	FROM 5 TO 20 FT.	INITIAL WATER DEPTH (FT): N/A	
SIZE AND TYPE OF FILTER PACK: #2/12 Monterey Sand	FROM 3 TO 20 FT.	LOGGED BY: DKM	
SEAL: Bentonite Chips	FROM 1 TO 3 FT.	SAMPLING METHODS: NA	WELL COMPLETION: ☐ SURFACE HOUSING ■ STAND PIPE N/A FT.
GROUT: Concrete	FROM 0 TO 1 FT.		

SAMPLES TYPE	SAMPLES RECOV. (FEET)	SAMPLES PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	OVA/PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									Approximately 4 inches from concrete.
								GP/ GC	**Poorly graded GRAVEL with clay and sand** CSBC gravel.
			5					GP	**Poorly graded GRAVEL** Pea gravel.
			10					SM	**Silty SAND** Silt/silty sand.
			15					SP	**Poorly graded SAND** Poorly graded sand.
			20						

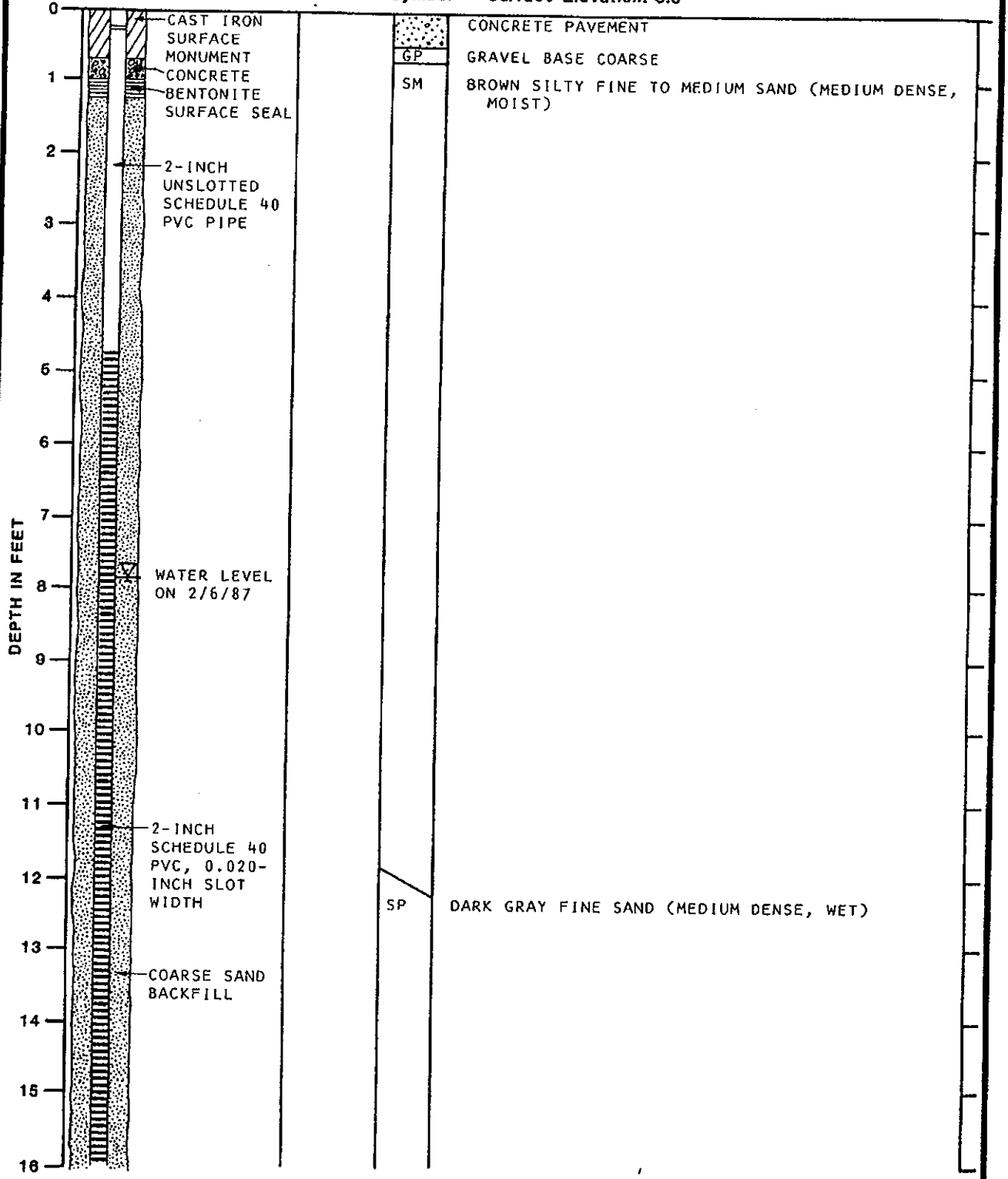
NOTES

1. No samples collected. Auger advanced with wood block at bottom to minimize disturbance to pea gravel.
2. Lithology based on previous data from soil boring and excavations.

KJ PNW PACCAR BORING LOGS SFA.GPJ KJ PNW.GDT 9/10/04

F-40.1
(6-87) (3-88) (8-90)

MONITOR WELL NO. 7



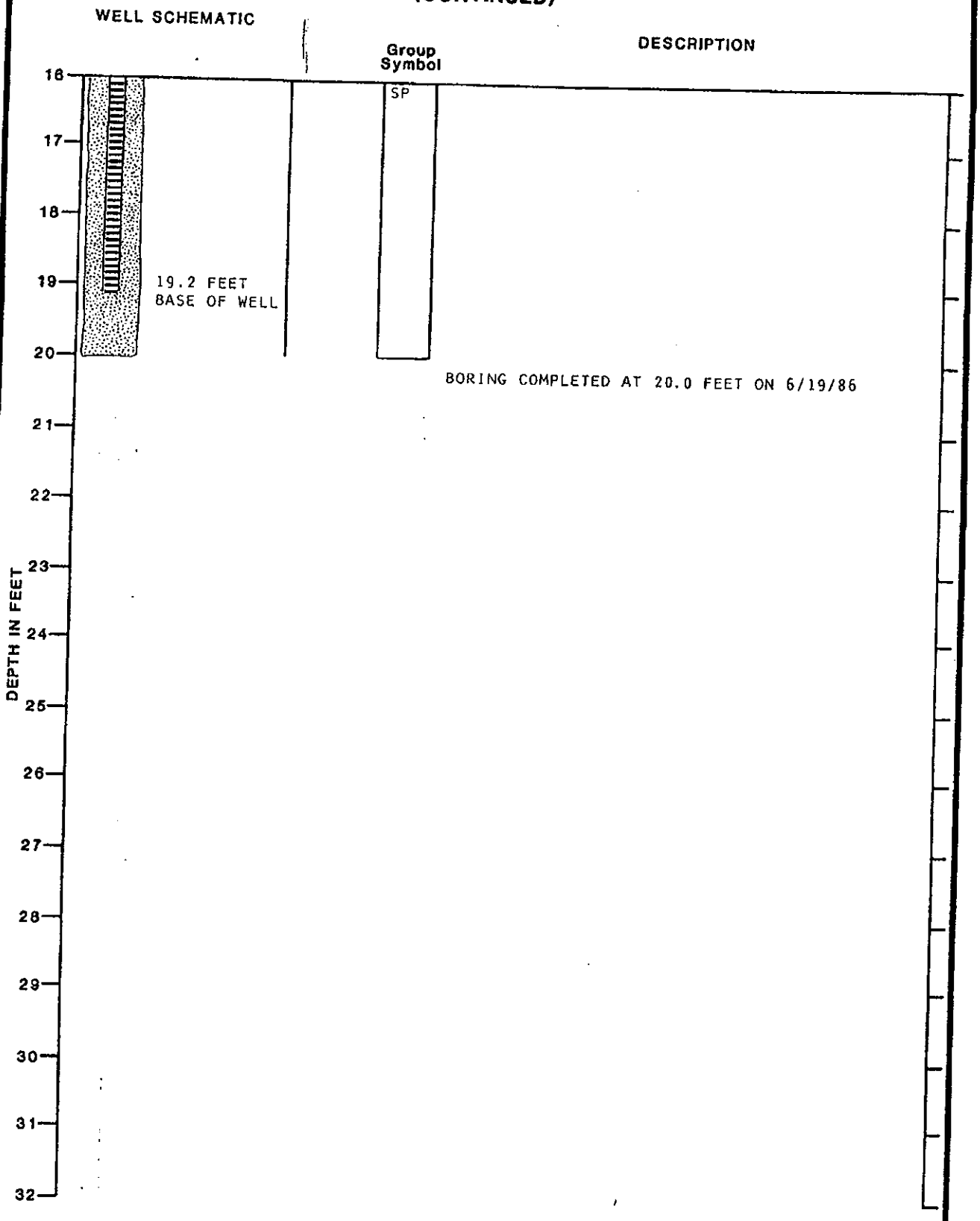
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-9A

929-04 SEW:JAM:dmp:el 2/6/87

MONITOR WELL NO. 7
(CONTINUED)



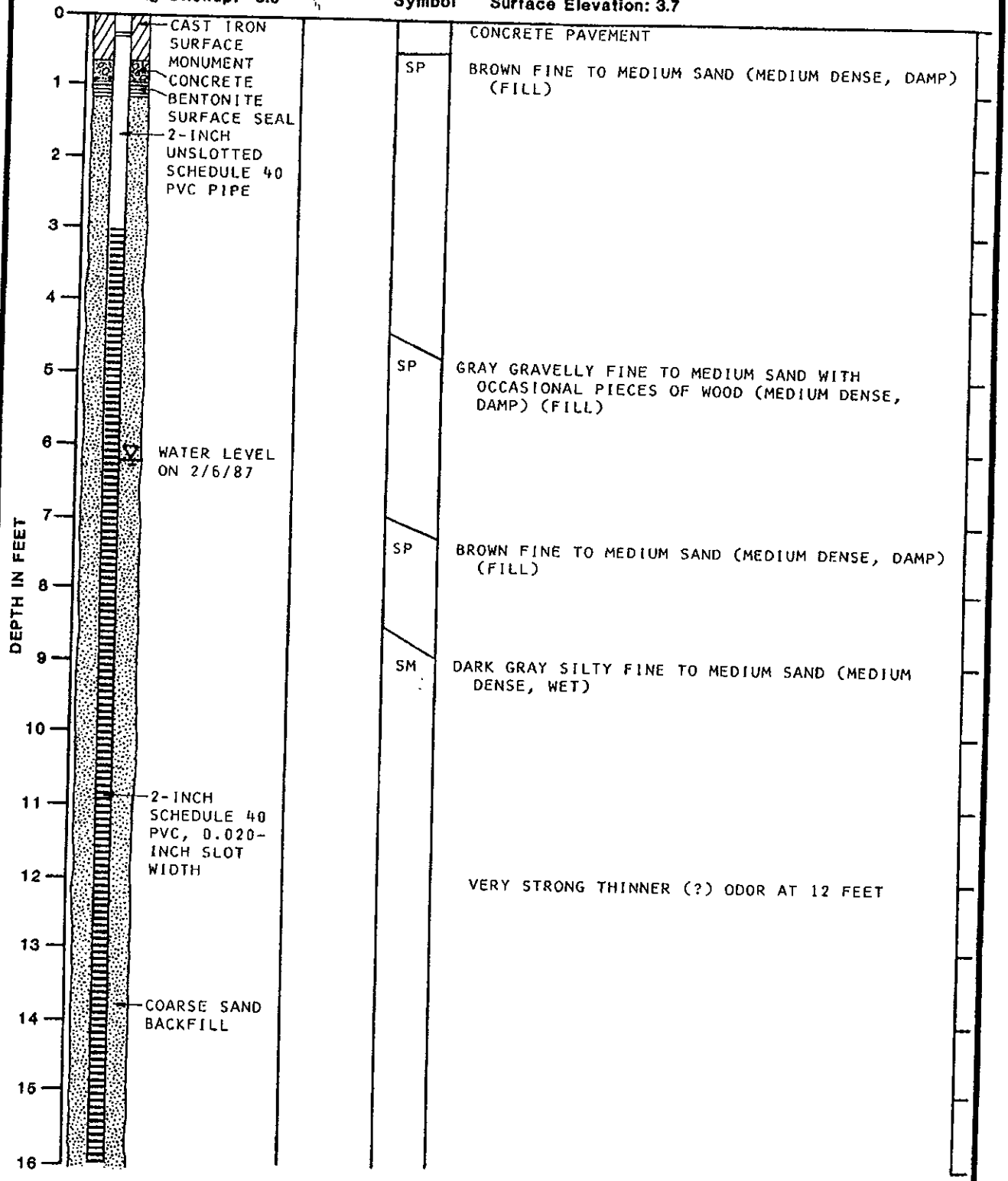
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-9B

929-04 SEW:JAM:dmp:el 2/6/87

MONITOR WELL NO. 8



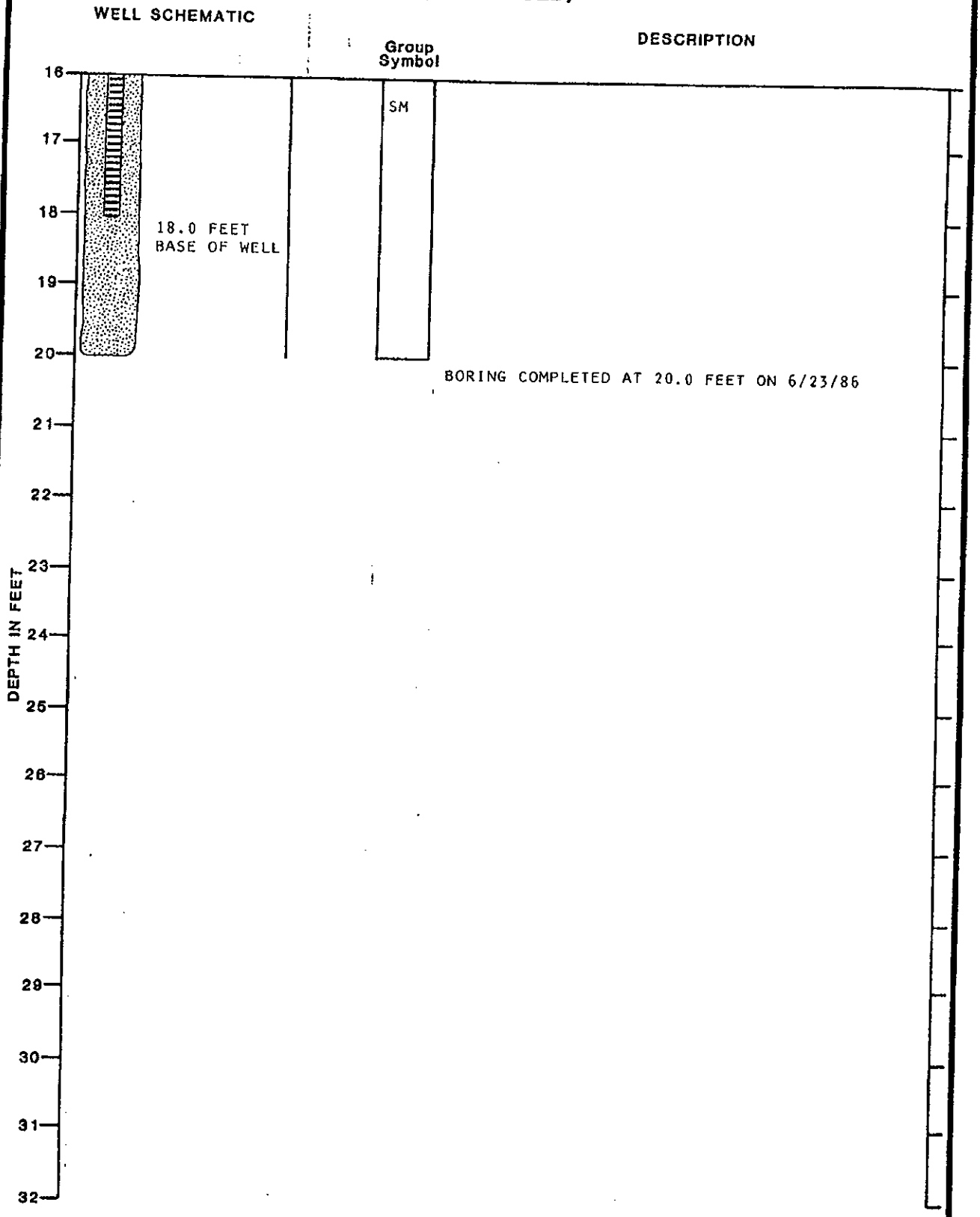
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-10A

929-04 SEW:JAM:dmp:el 2/6/87

MONITOR WELL NO. 8
(CONTINUED)



GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-10B

929-04 SEW:JAM:dmp:e1 2/6/87

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	NORTH FIRE AISLE
DRILLING COMPANY	CASCADE
DRILLER	JAMES
DRILLING METHOD	HSA
DRILL BIT(S) SIZE:	9-INCH OD

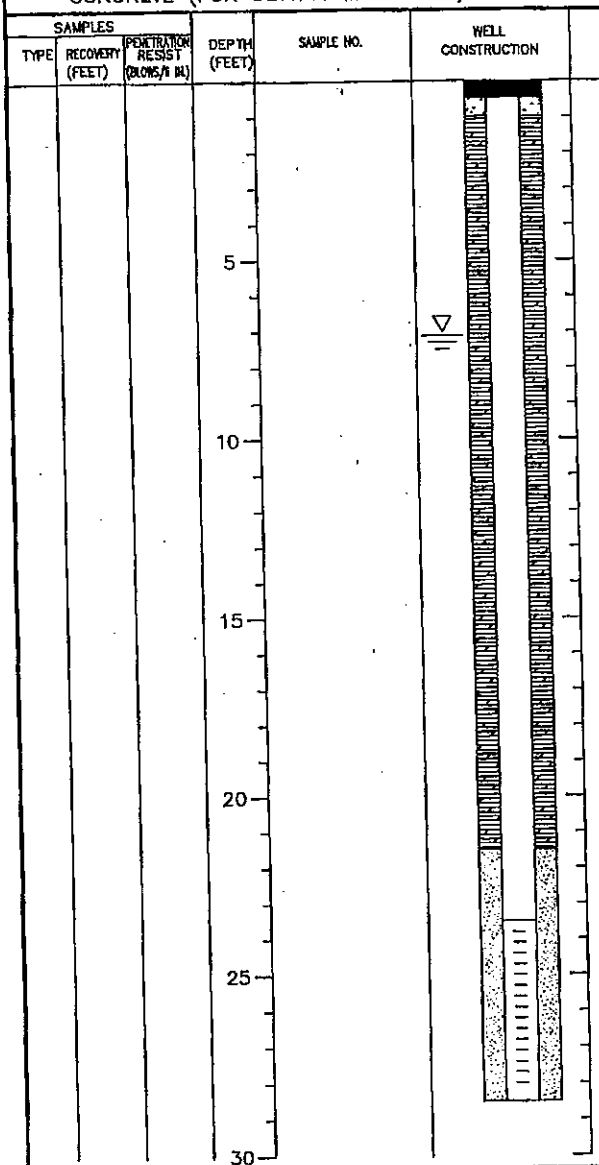
	FROM	TO	FT.
ISOLATION CASING			
BLANK CASING 2" SCHEDULE 40 PVC PIPE	0.0	23.5	FT.
PERFORATED CASING 2" SCHEDULE 40 PVC PIPE (0.010 SLOT)	23.5	28.5	FT.
SIZE AND TYPE OF FILTER PACK LAPIS LUSTRE #2/12 MONTEREY SAND	21.5	28.5	FT.
SEAL PURE GOLD BENTONITE CHIPS	1.0	21.5	FT.
GROUT CONCRETE (FOR SETTING MONUMENT)	0.0	1.0	FT.

Boring/Well Name MW-88

Project Name PACCAR DATA GAPS

Project Number 016110.00

ELEVATION AND DATUM	TOTAL DEPTH 28.5
DATE STARTED 03/14/2002	DATE COMPLETED 03/14/2002
INITIAL WATER DEPTH (FT) 7.0	
LOGGED BY DKM	
SAMPLING METHODS	WELL COMPLETION ■ SURFACE HOUSING ☐ STAND PIPE ____ FT.

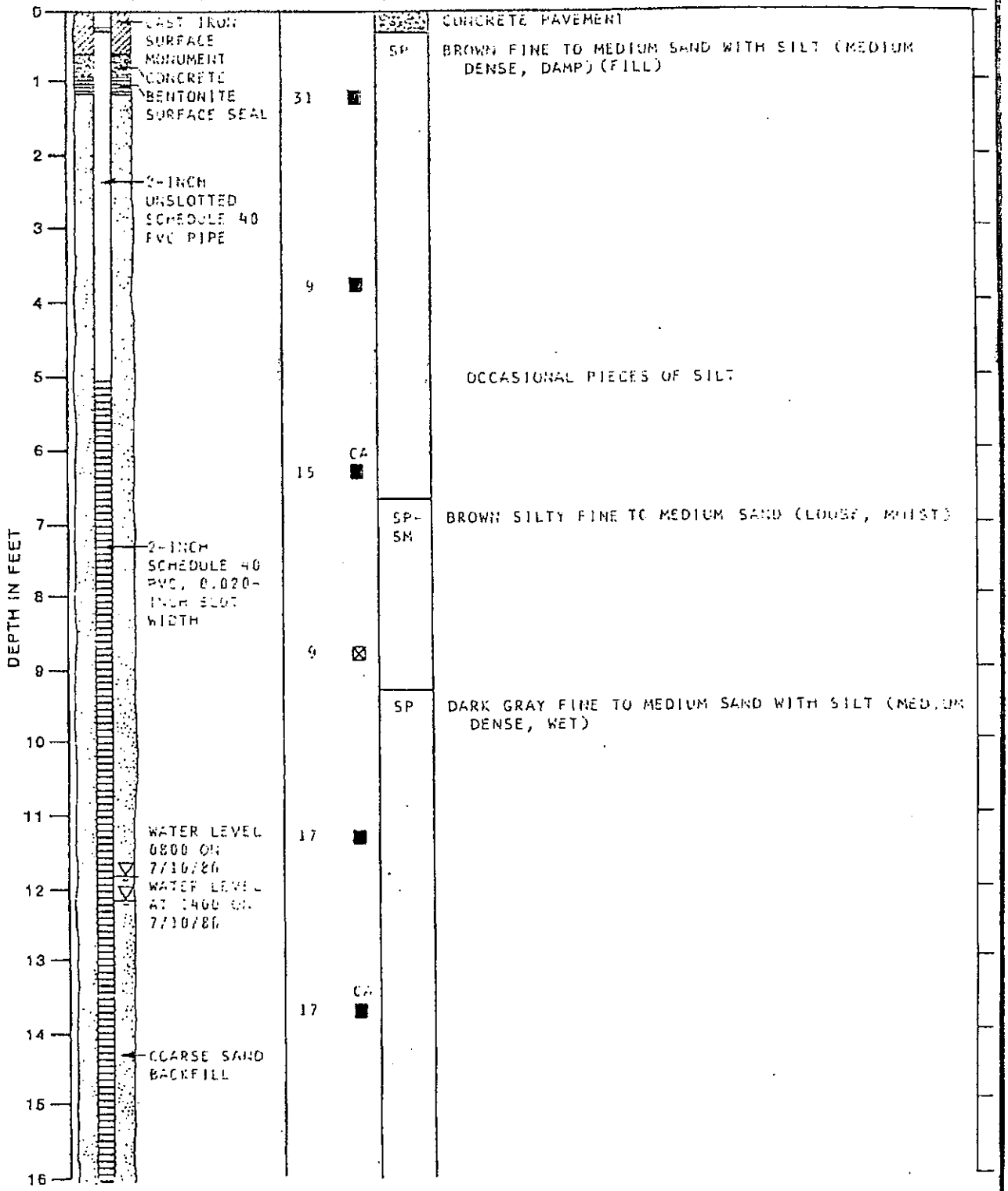


USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
	Concrete
SW	**Well-graded SAND with gravel** Gray sand with 25–35% gravel, appears to be fill material.
SW/SM	**Well-graded SAND with silt and gravel**
ML	Dark gray sand with fine gravel (5–10%) and silt (5–10%), strong chemical odor.
	SILT Gray dense silt, no odor.
ML	**Sandy SILT** Gray, wet, silt and fine sand mixture.
SP	**Poorly graded SAND** Gray poorly graded fine- to medium- sand, no odor.
ML	**SILT** Gray dense silt, no odor.

Notes:

1. Lithology is based on geoprobe boring NA-7.

MONITOR WELL NO. 9



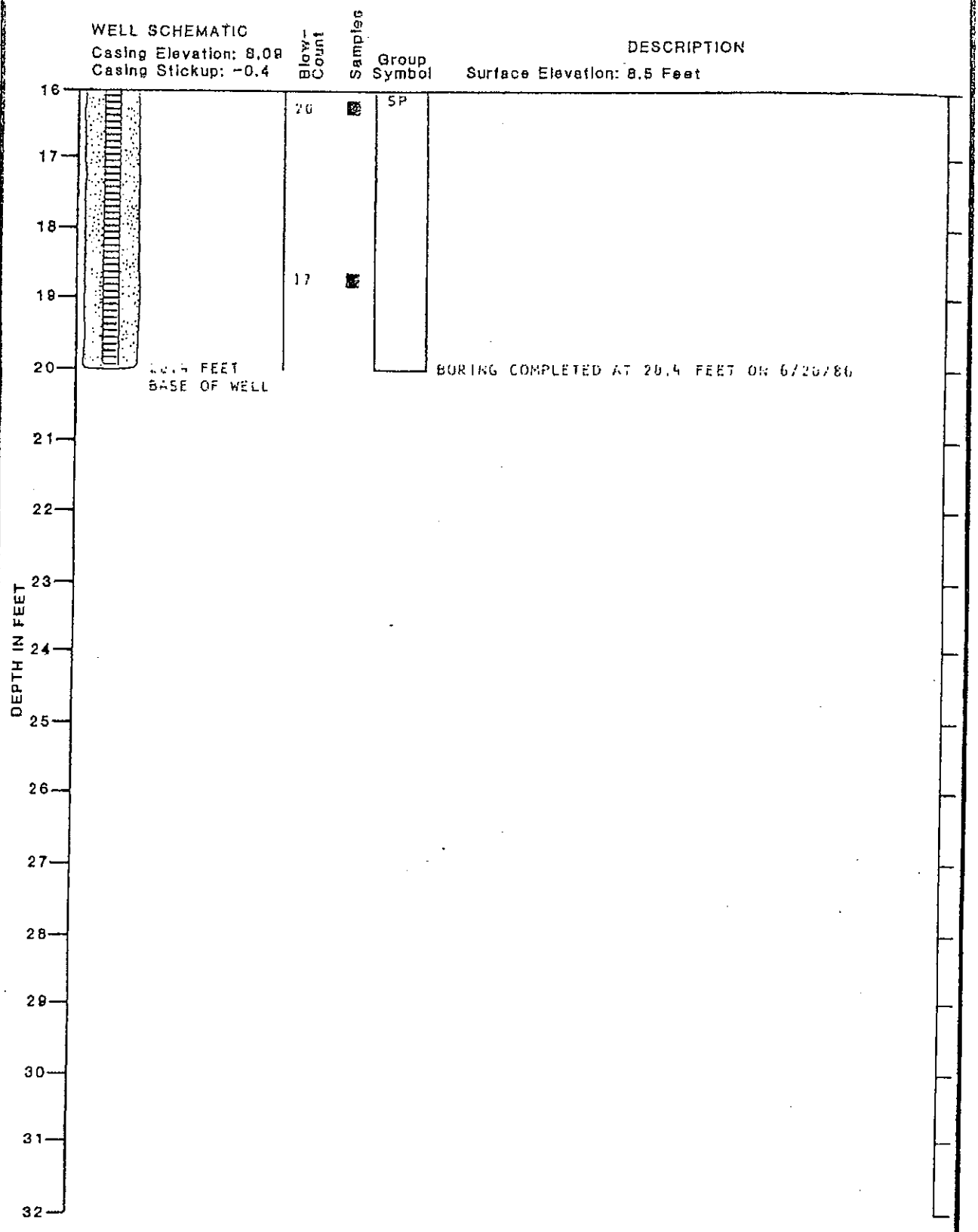
Note: See Figure A-2 for Explanation of Symbols

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-3A

MONITOR WELL NO. 9 (CONTINUED)

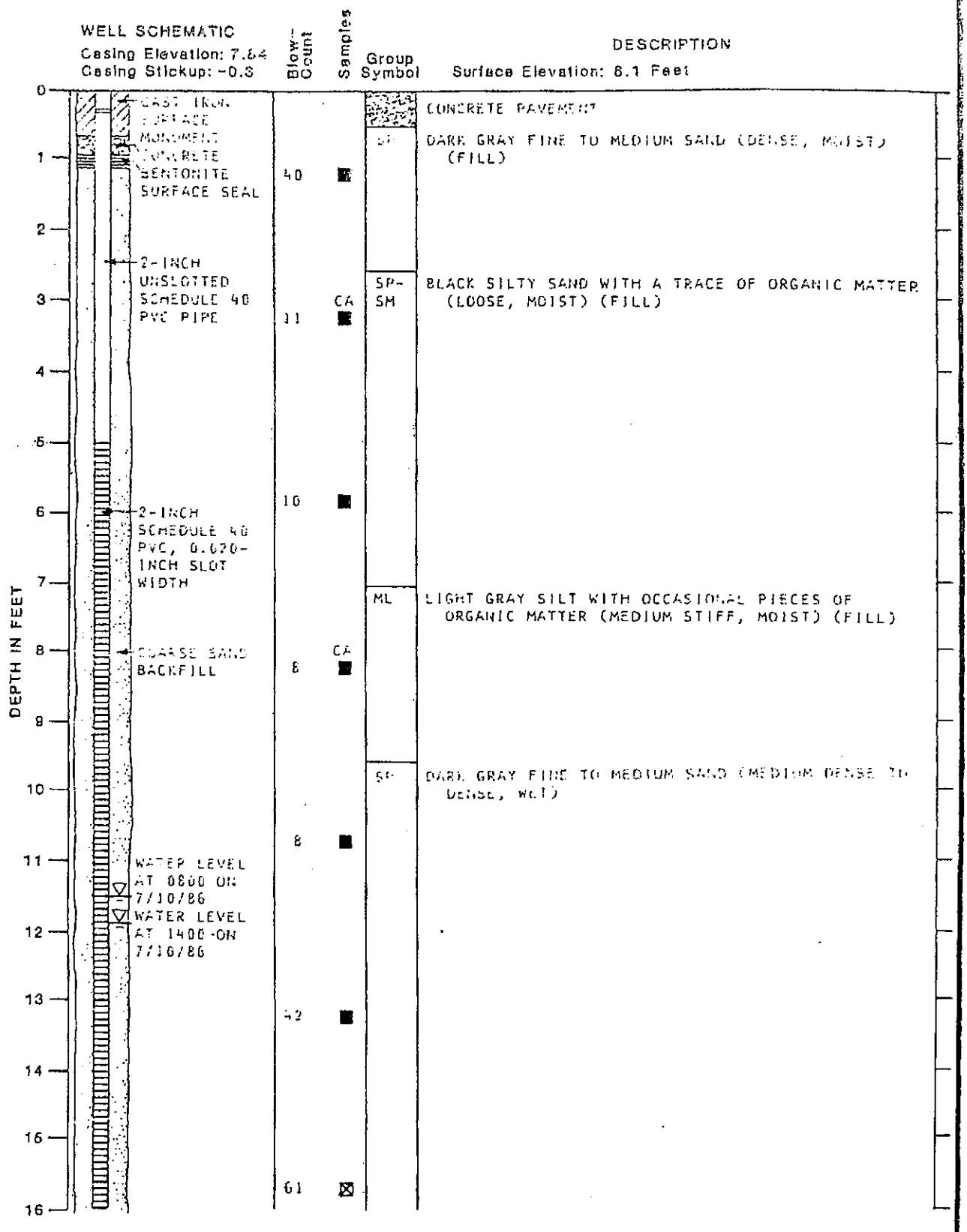


GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-3B

MONITOR WELL NO. 10

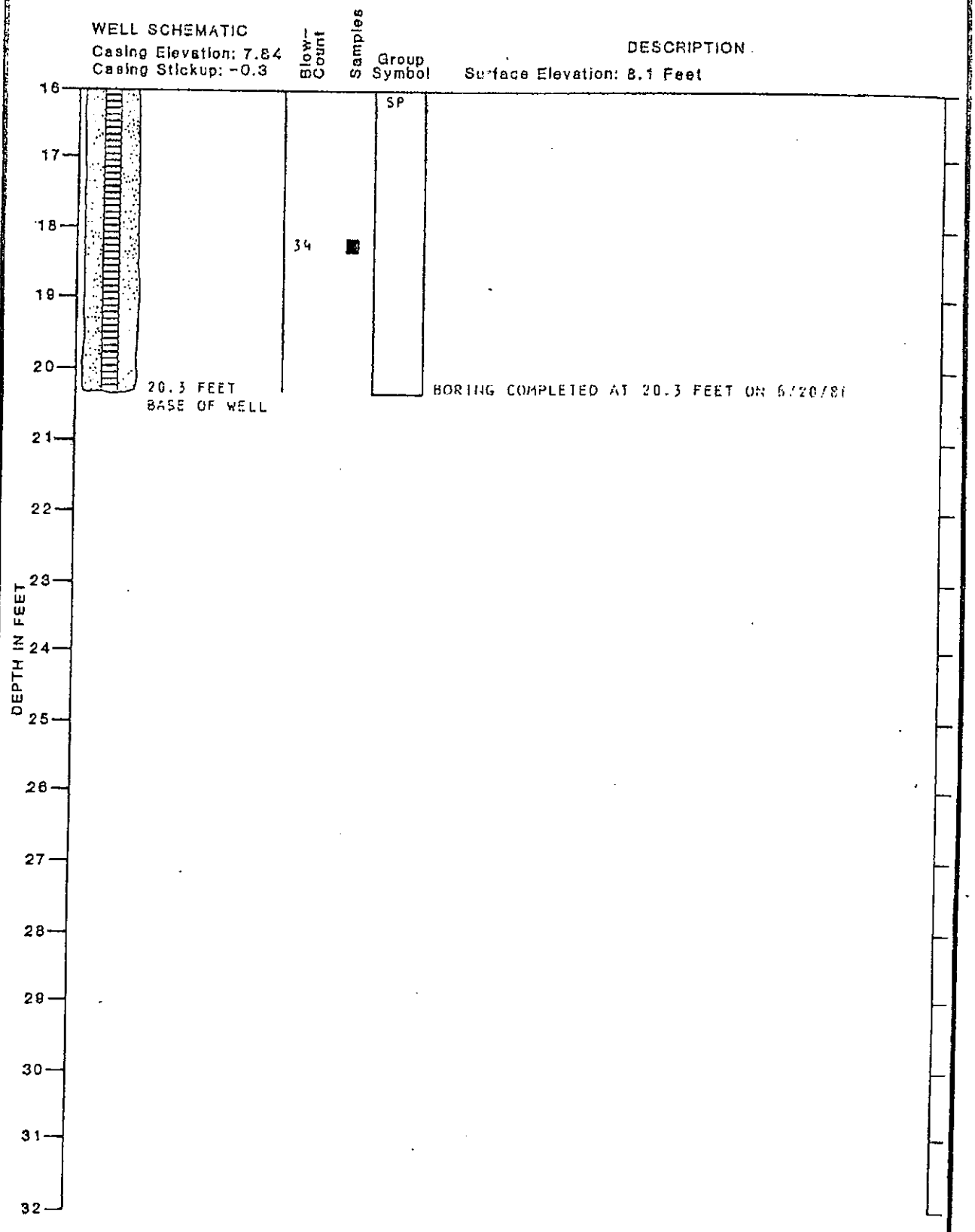


GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-4A

MONITOR WELL NO. 10 (CONTINUED)

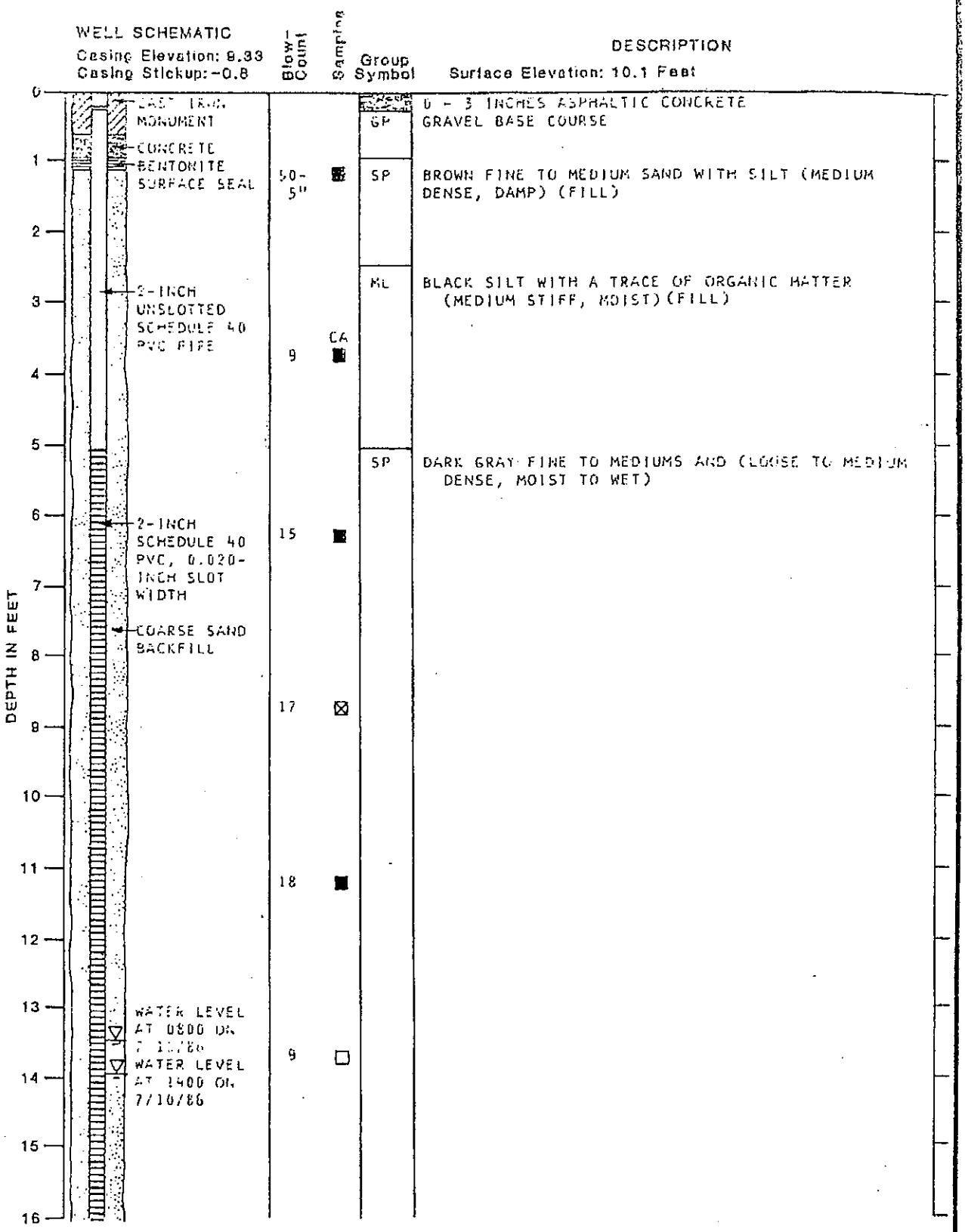


GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-4B

MONITOR WELL NO. 11

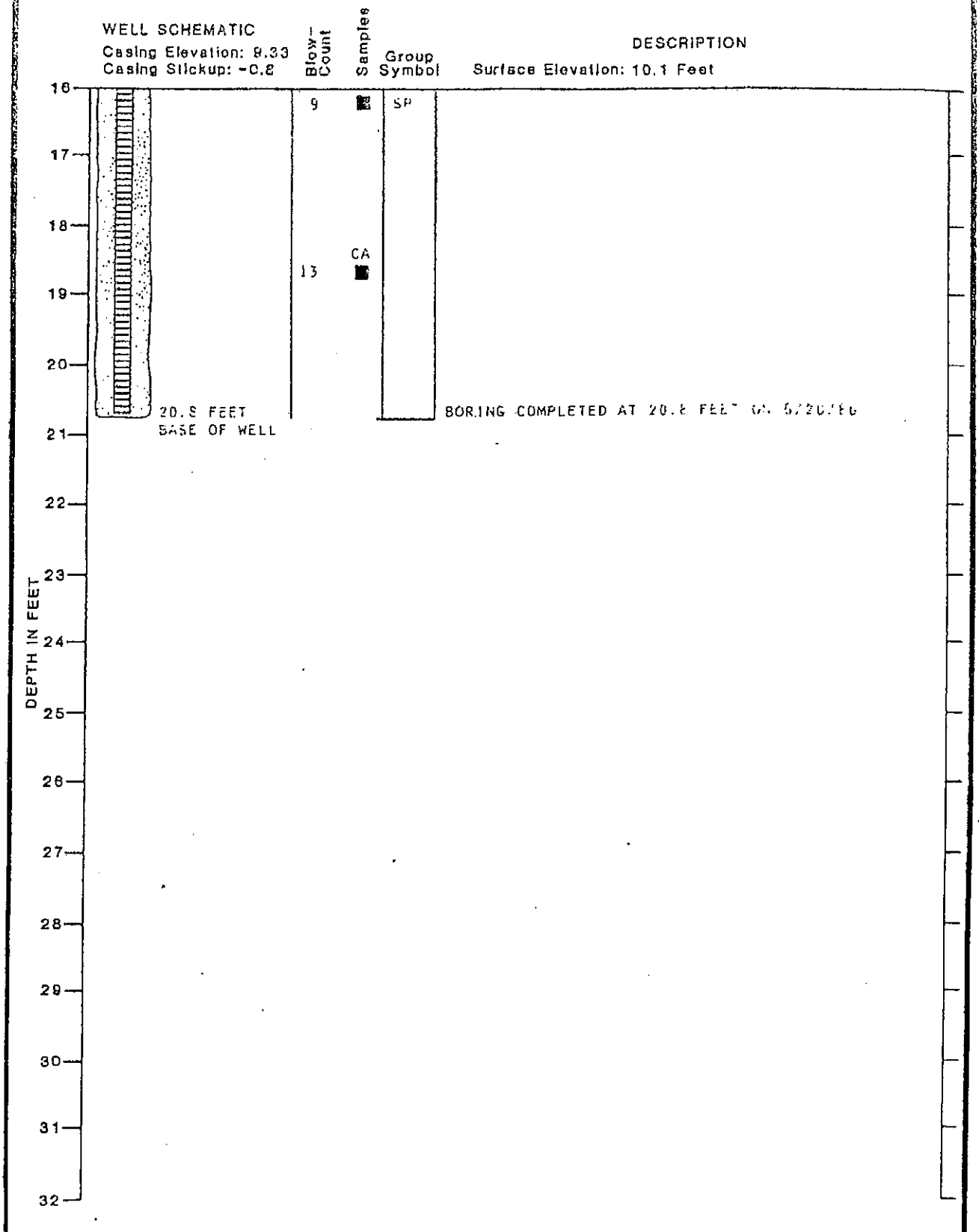


GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-5A

MONITOR WELL NO. 11 (CONTINUED)



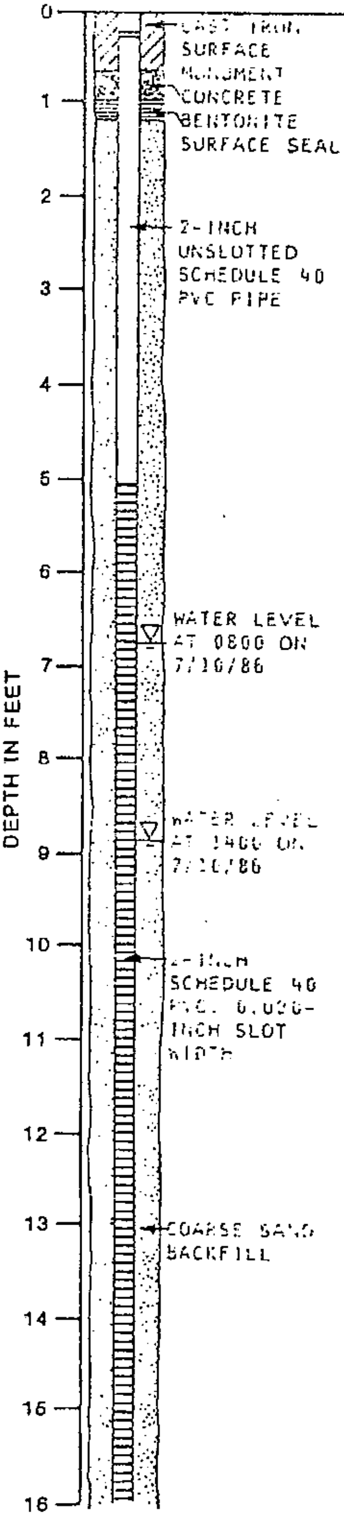
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-5B

MONITOR WELL NO. 12

WELL SCHEMATIC
Casing Elevation: 2.57
Casing Stickup: ~0.5



Depth (ft)	Blow Count	Samples	Group Symbol	DESCRIPTION (Surface Elevation: 3.1 Feet)
0 – 0.5				0 - 6 INCHES CONCRETE PAVEMENT
0.5 – 2.5	65	■	SP	BROWN FINE TO MEDIUM SAND (DENSE, DAMP)
2.5 – 7	4	CA ■	ML	BLACK SILT WITH A TRACE OF ORGANIC MATTER (SOFT, MOIST)
	9	■		
7 – 9.8	7	CA ■	SP-SM	BLACK SILTY FINE SAND (LOOSE, MOIST)
9.8 – 16	11	■	SP	DARK GRAY FINE TO MEDIUM SAND (MEDIUM DENSE TO DENSE, WET)
	25	■		

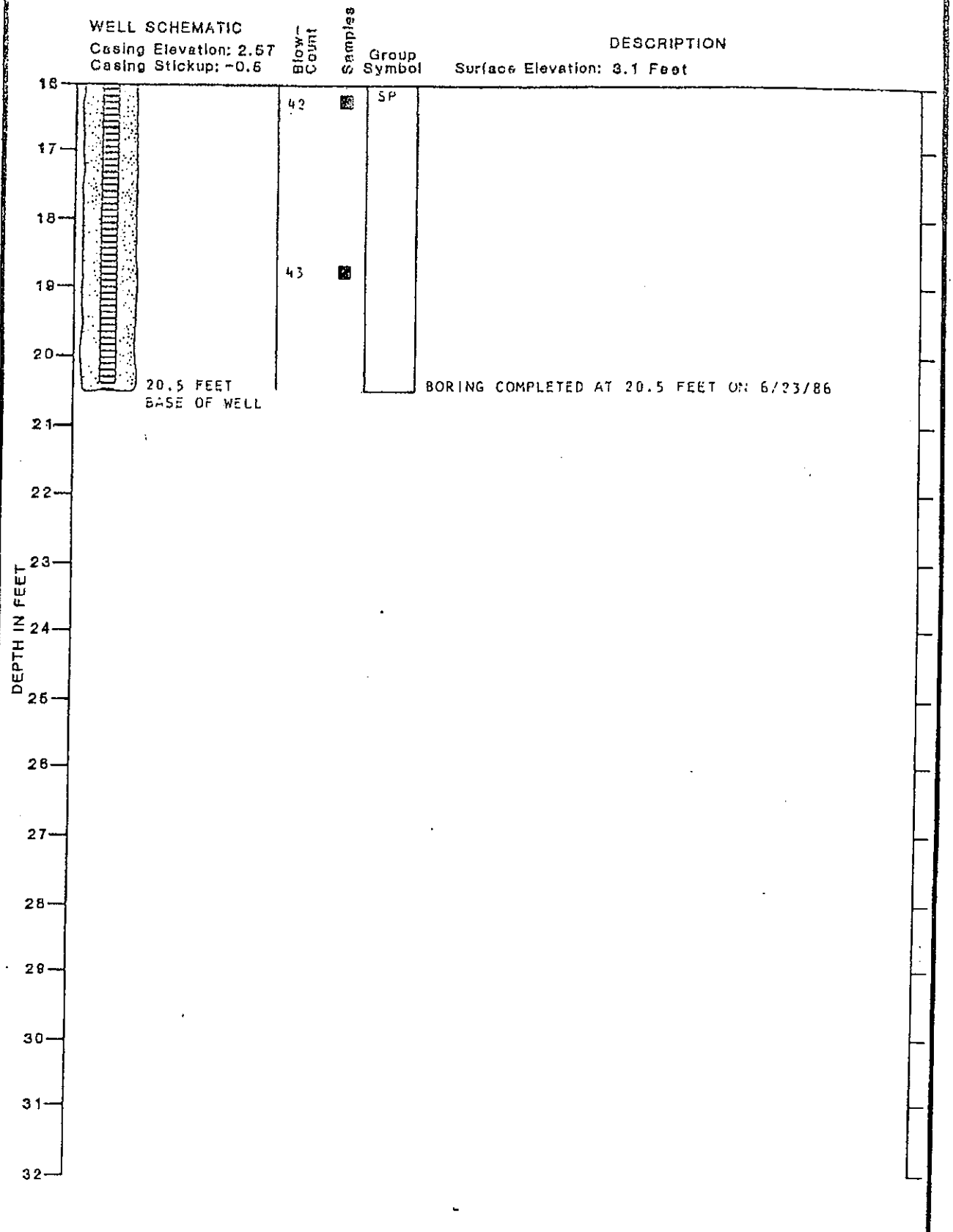
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-6A

SCR:JAH:DMP:11 9/11/86 929-03

MONITOR WELL NO. 12 (CONTINUED)



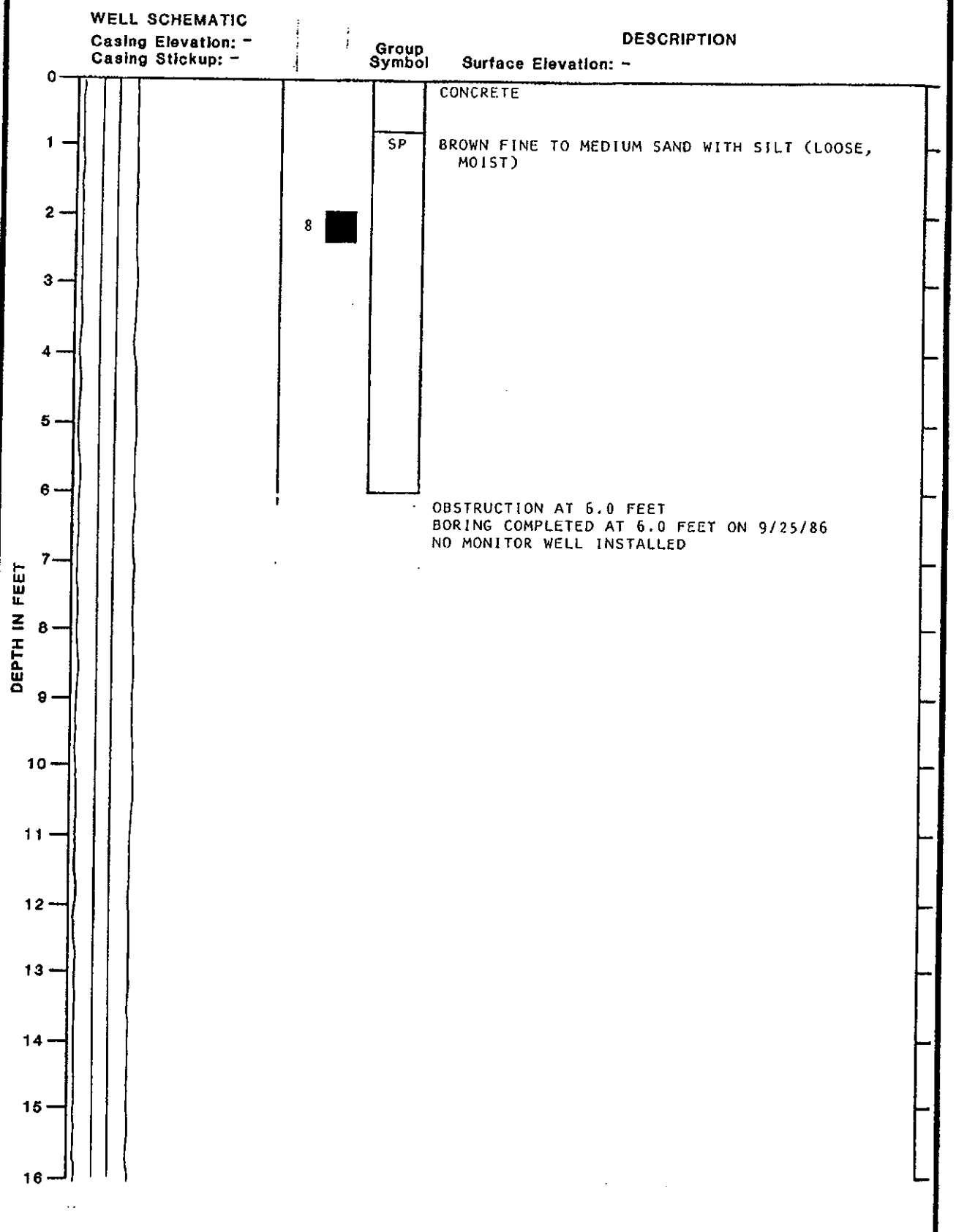
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-6B

920-03 9/11/86

MONITOR WELL NO. 13



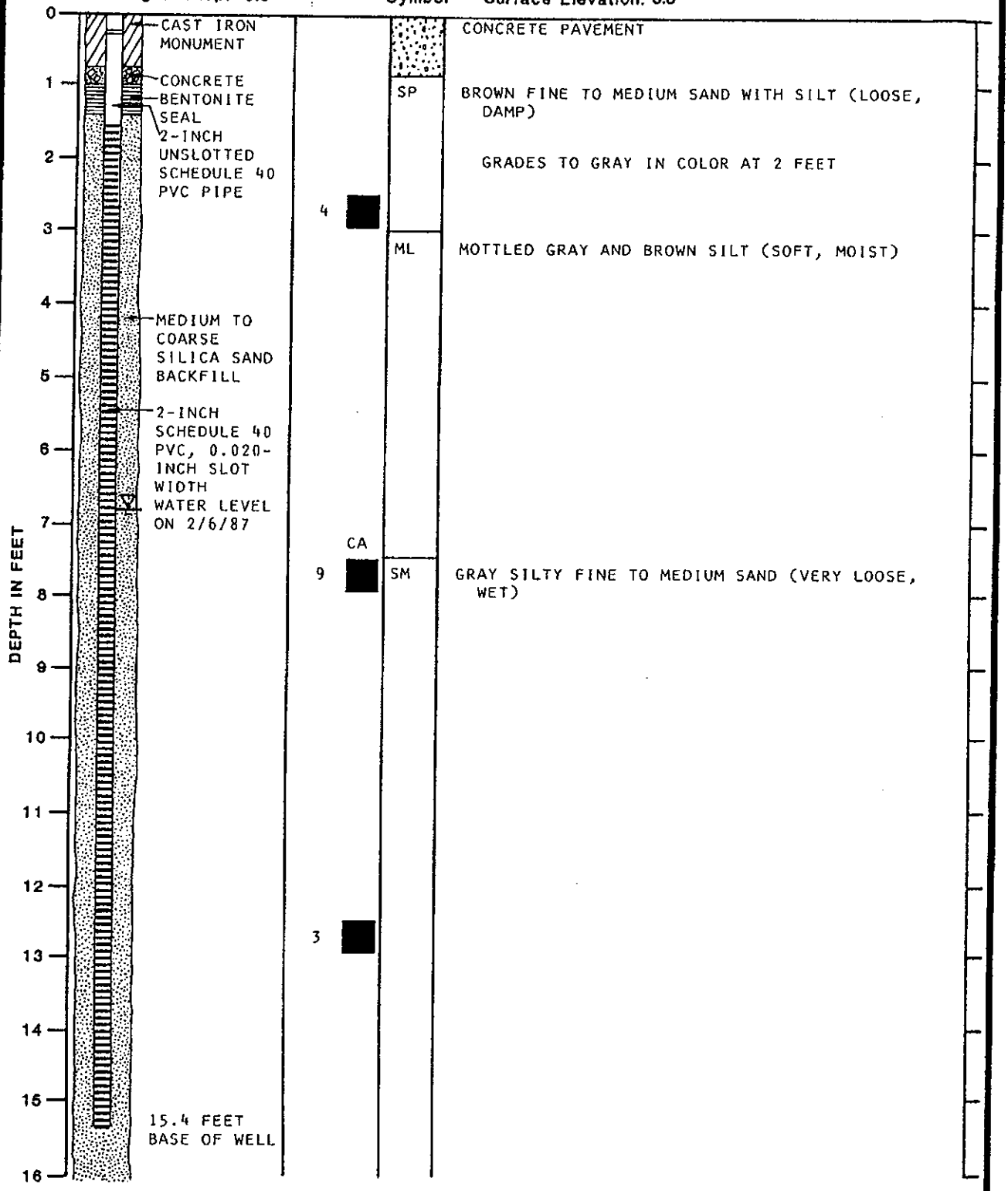
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-11

929-04 SEW:JAM:DMP:EL 2/18/87

MONITOR WELL NO. 14



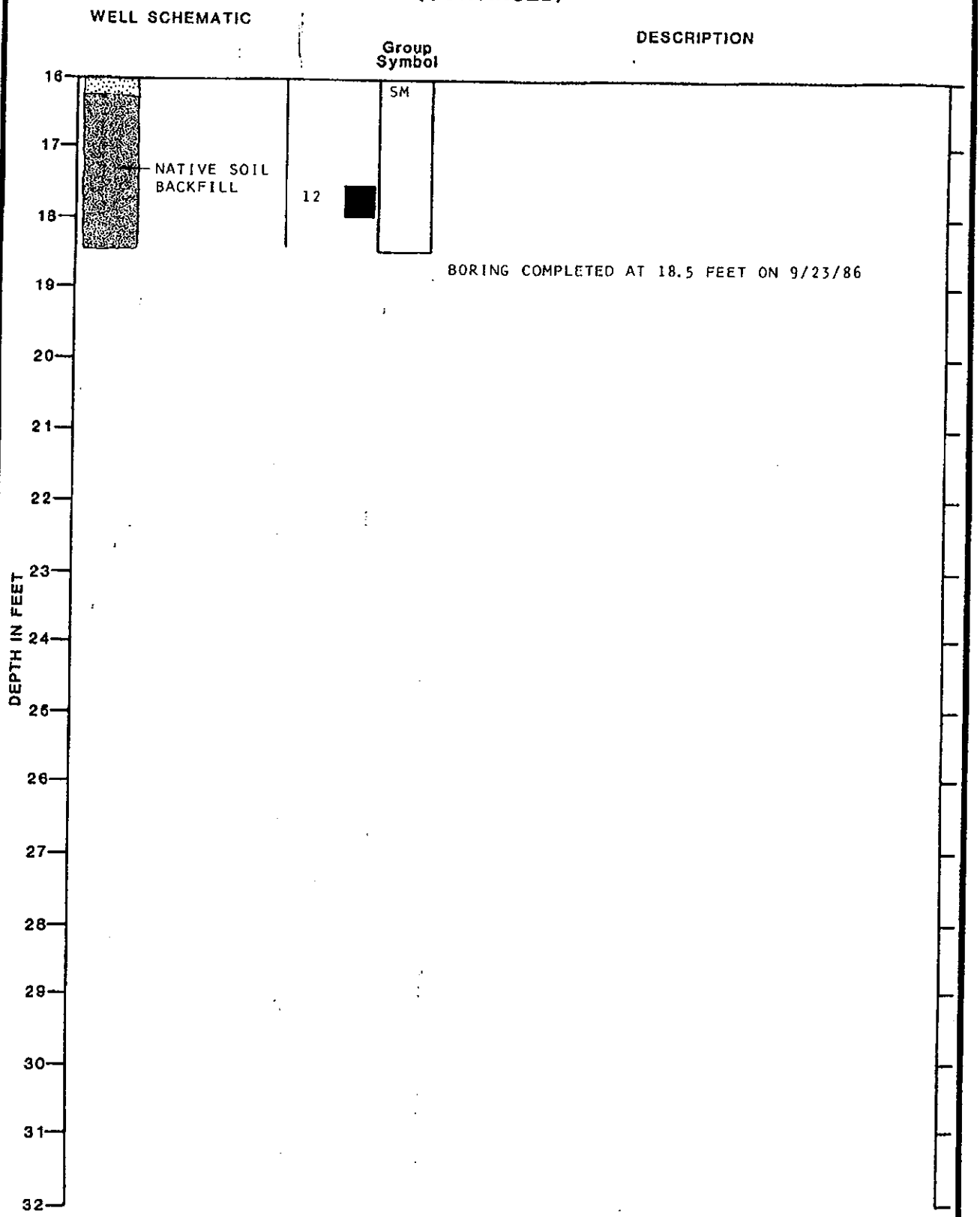
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-12A

929-04 SEW:JAM:dmp:e1 2-6-87

MONITOR WELL NO. 14
(CONTINUED)



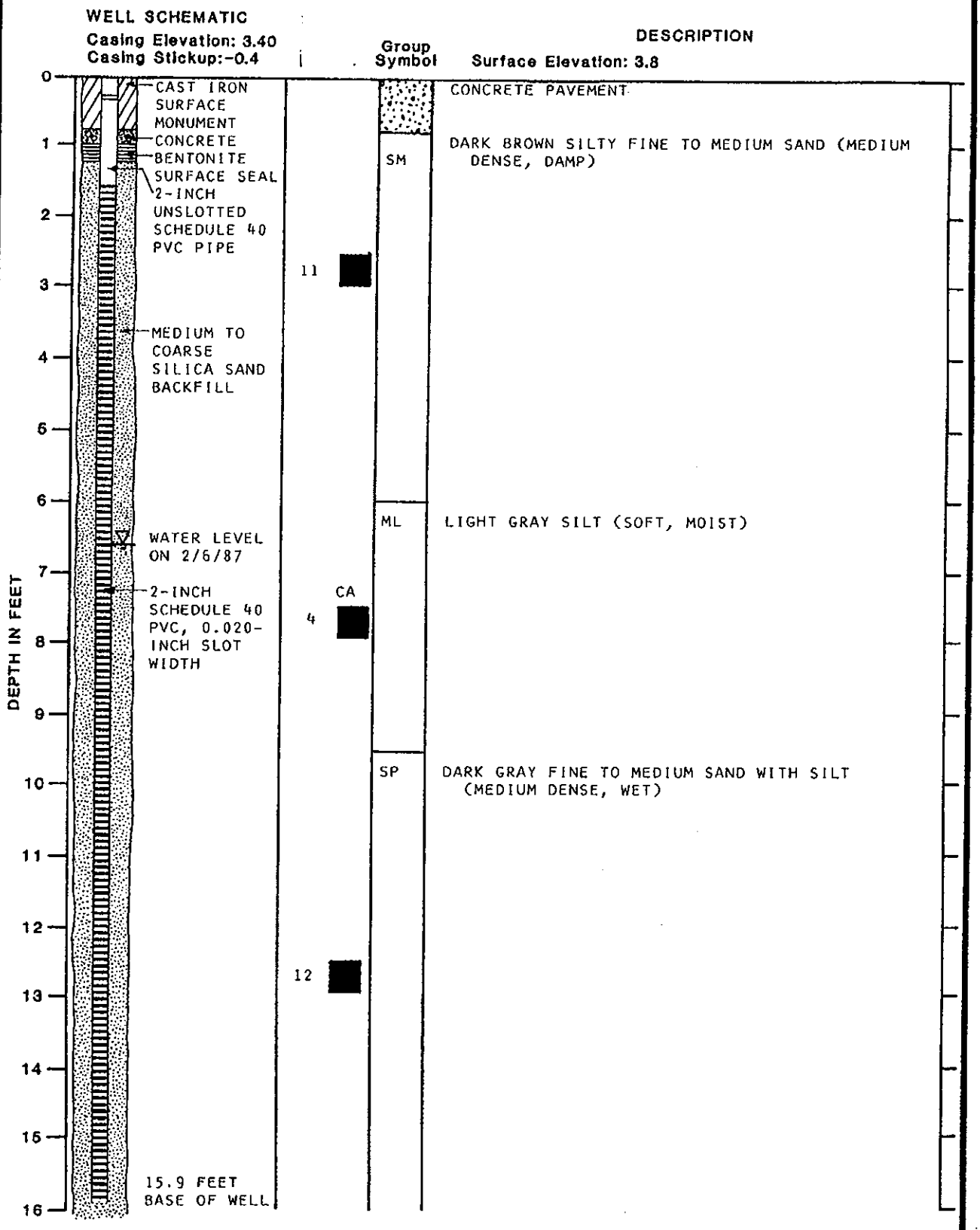
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-12B

929-04 SEW:JAM:dmp:el 2/6/87

MONITOR WELL NO. 15



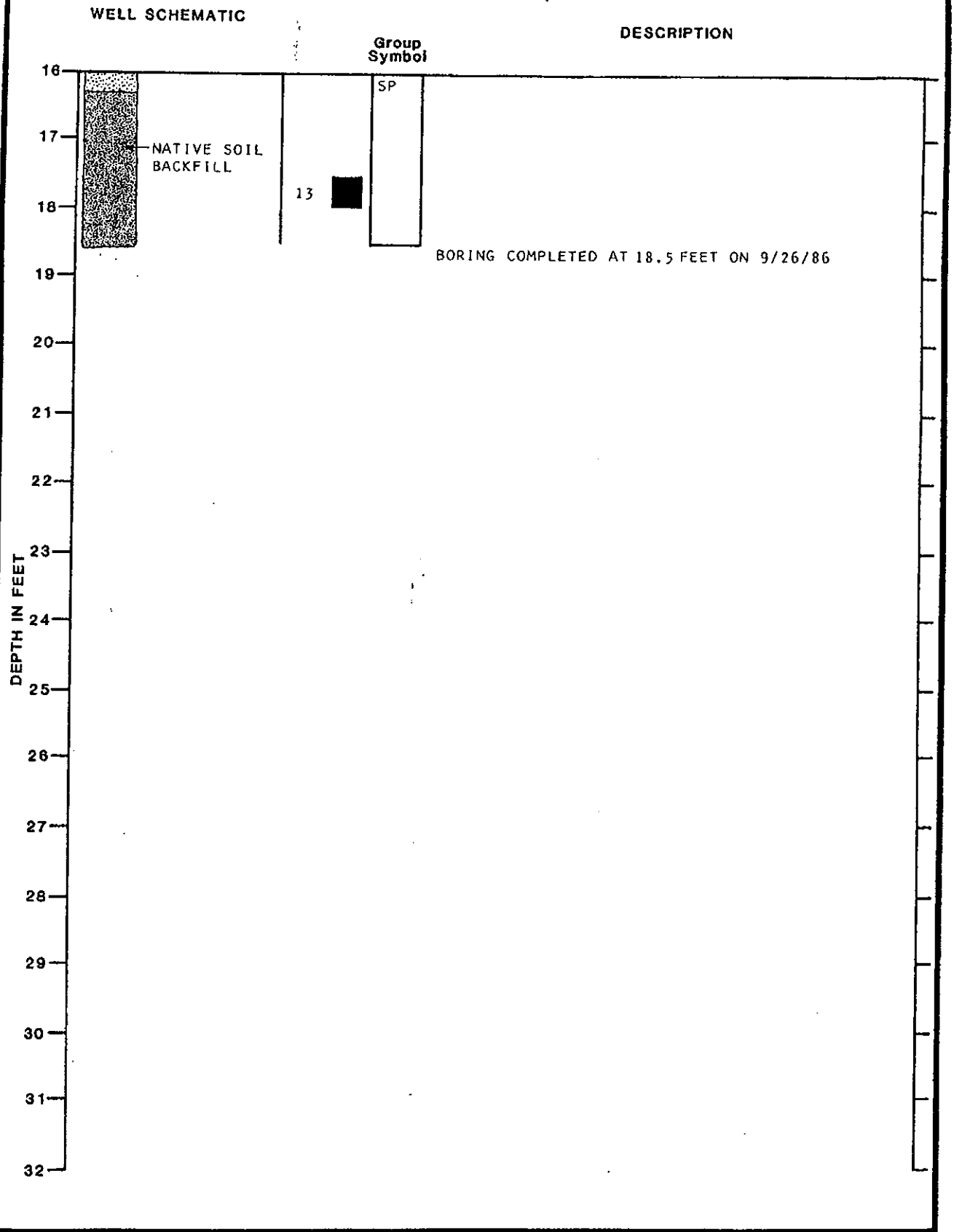
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-13A

929-04 SEW:JAM:dmp:el 2/6/87

MONITOR WELL NO. 15
(CONTINUED)



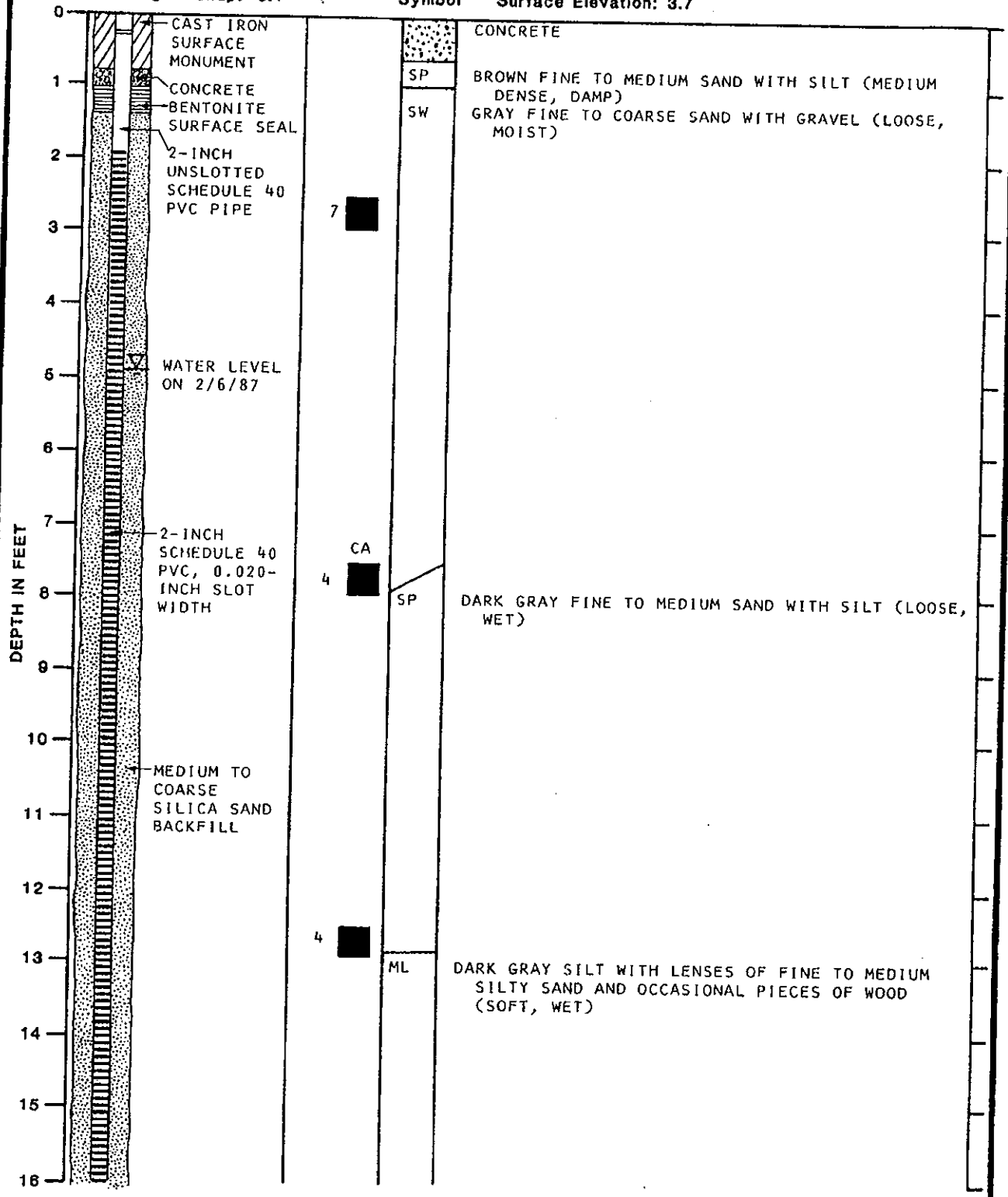
929-04 SEW:JAM:dmp:e1 2/6/87

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-13B

MONITOR WELL NO. 16



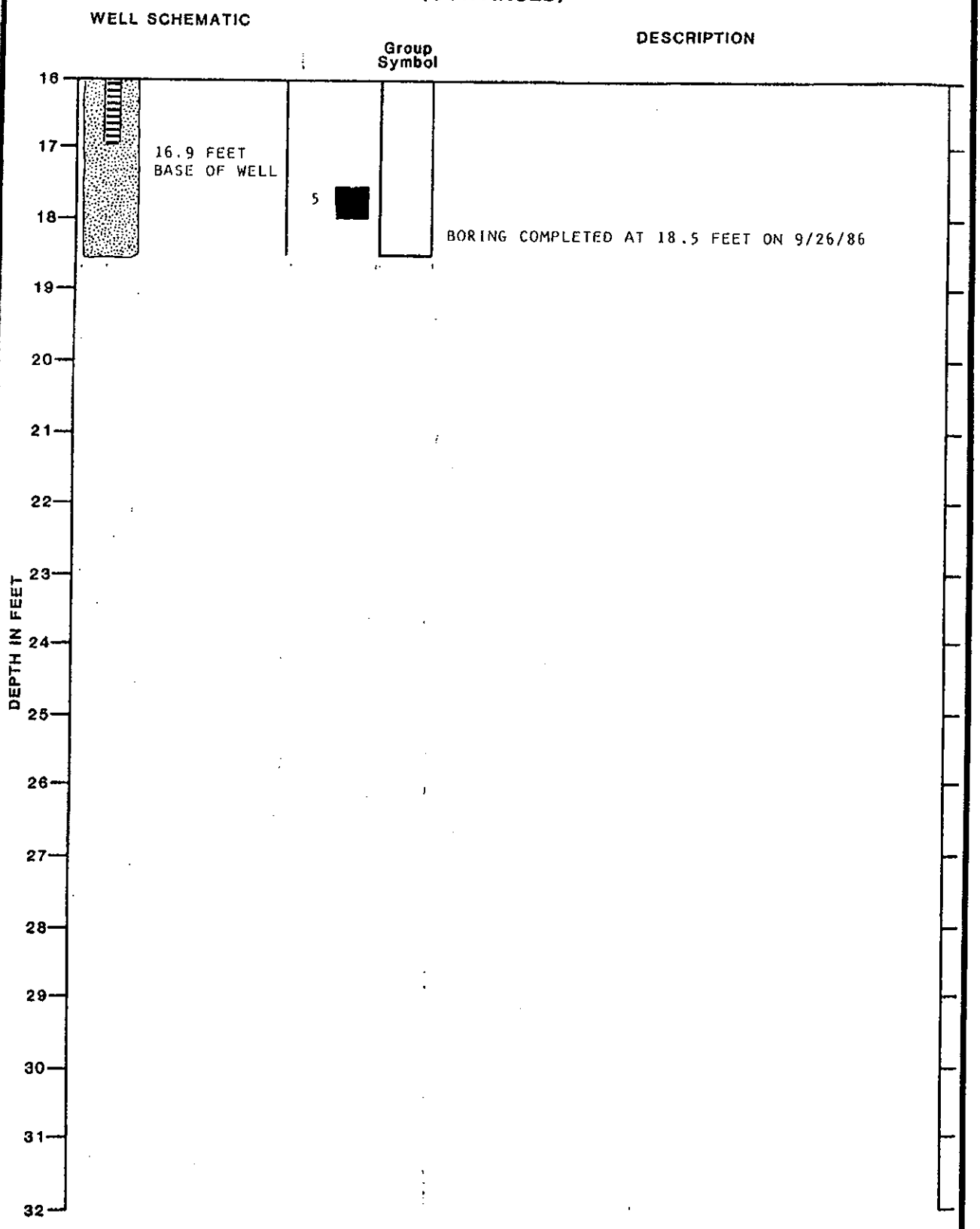
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-14A

929-04 SEW:JAM:dmp:el 2/6/87

MONITOR WELL NO. 16
(CONTINUED)



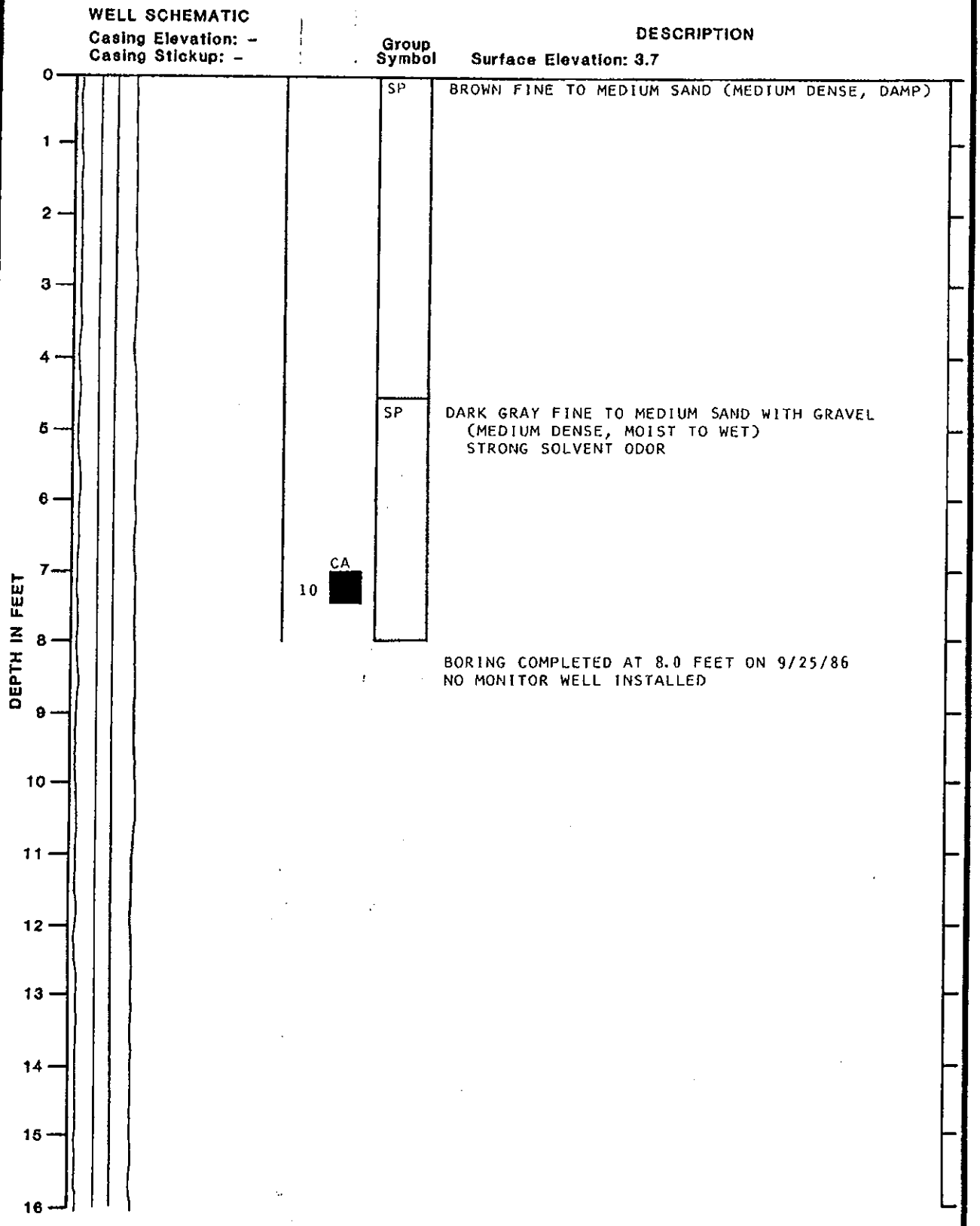
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-14B

SEW:JAM:DMP:EL 929-04 2/9/87

MONITOR WELL NO. 17



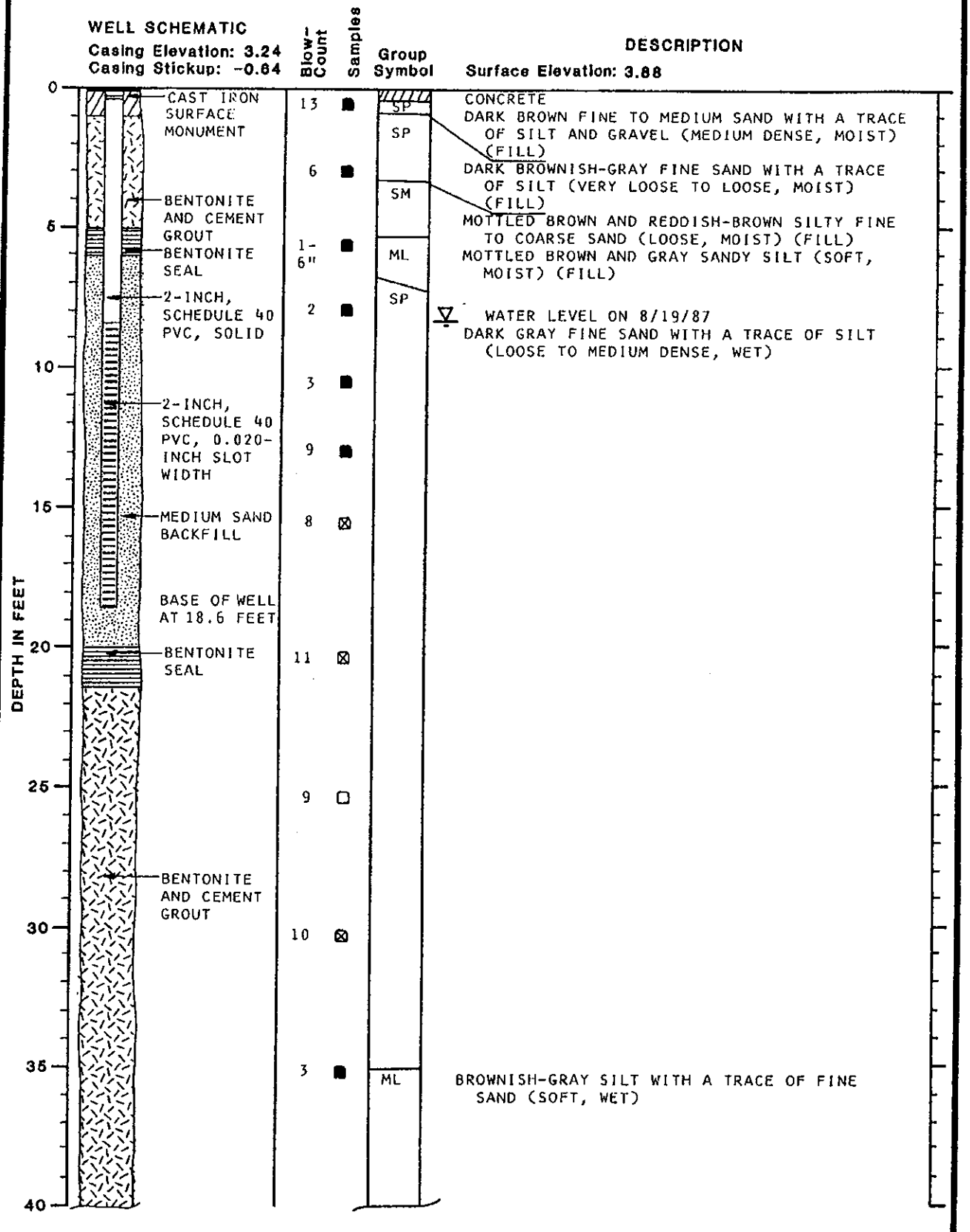
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-15

929-04 SEW:JAM:DMP:EL 2/9/87

MONITOR WELL NO. MW-18



Note: See Figure A-2 for Explanation of Symbols

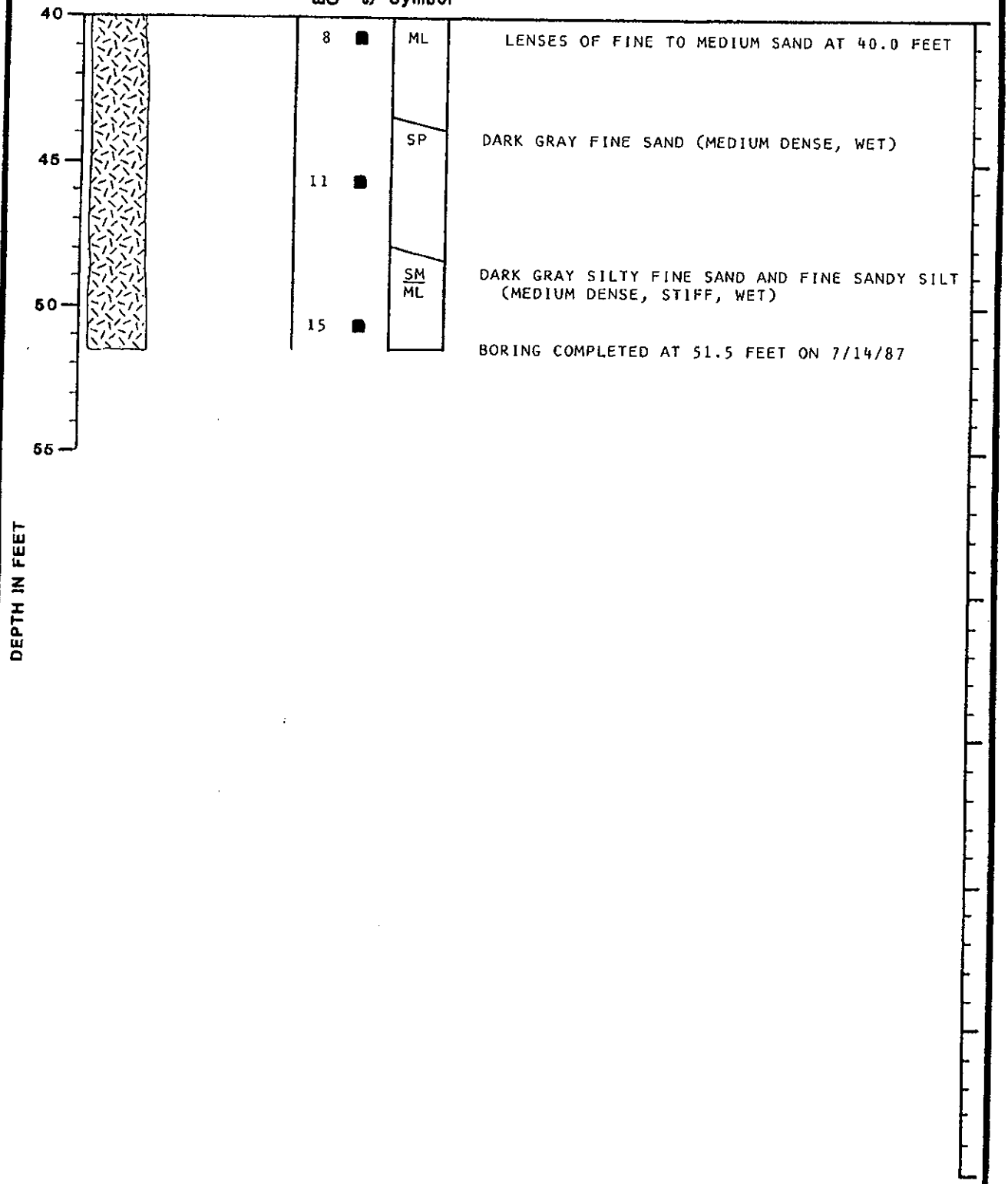
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-16A

0929-06-4 SEW:EL:KKT 9-4-87

MONITOR WELL NO. MW-18
Continued



Note: See Figure A-2 for Explanation of Symbols

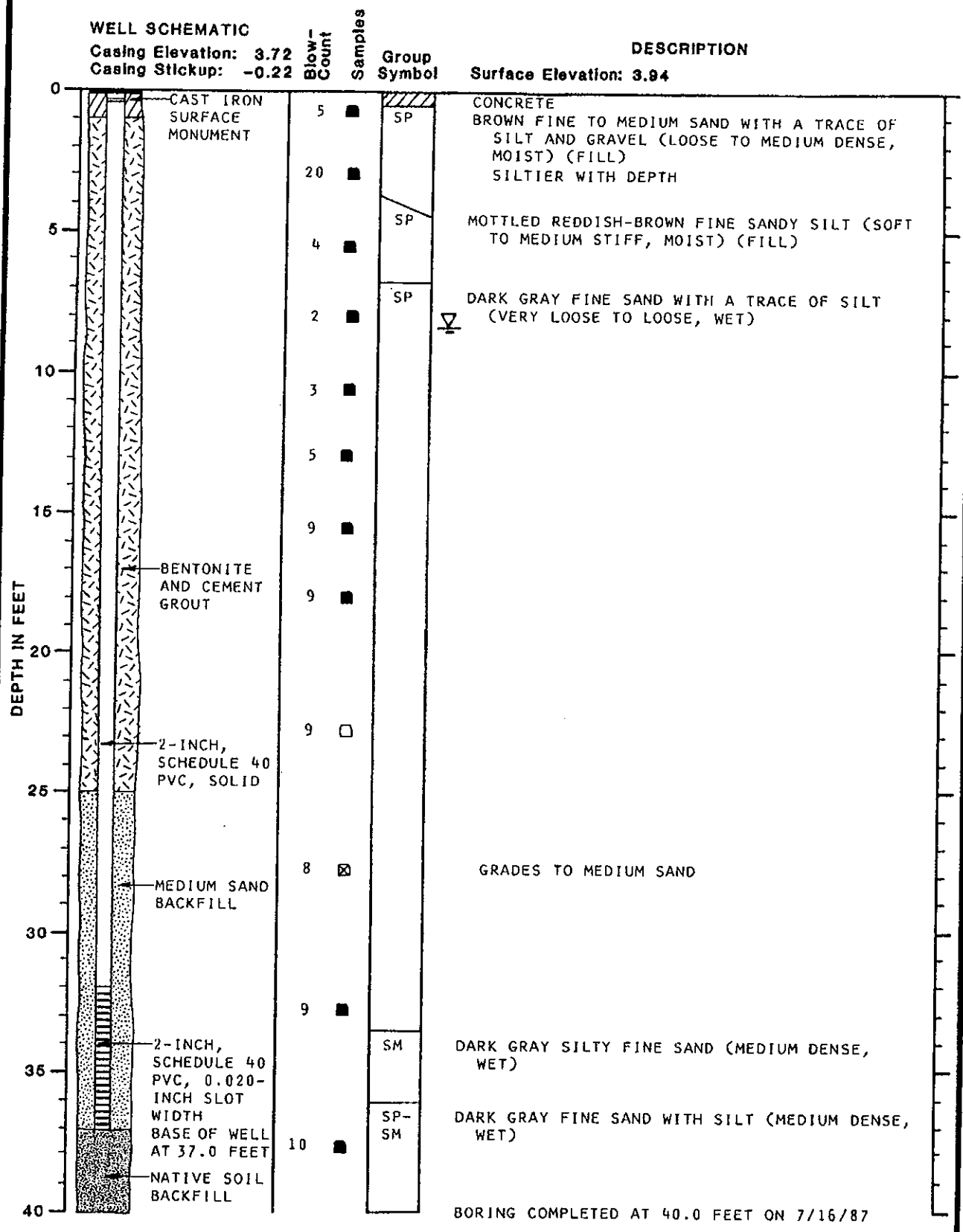
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-16B

0929-06-4 SEW:EL:KKT 9-4-87

MONITOR WELL NO. MW-19



Note: See Figure A-2 for Explanation of Symbols

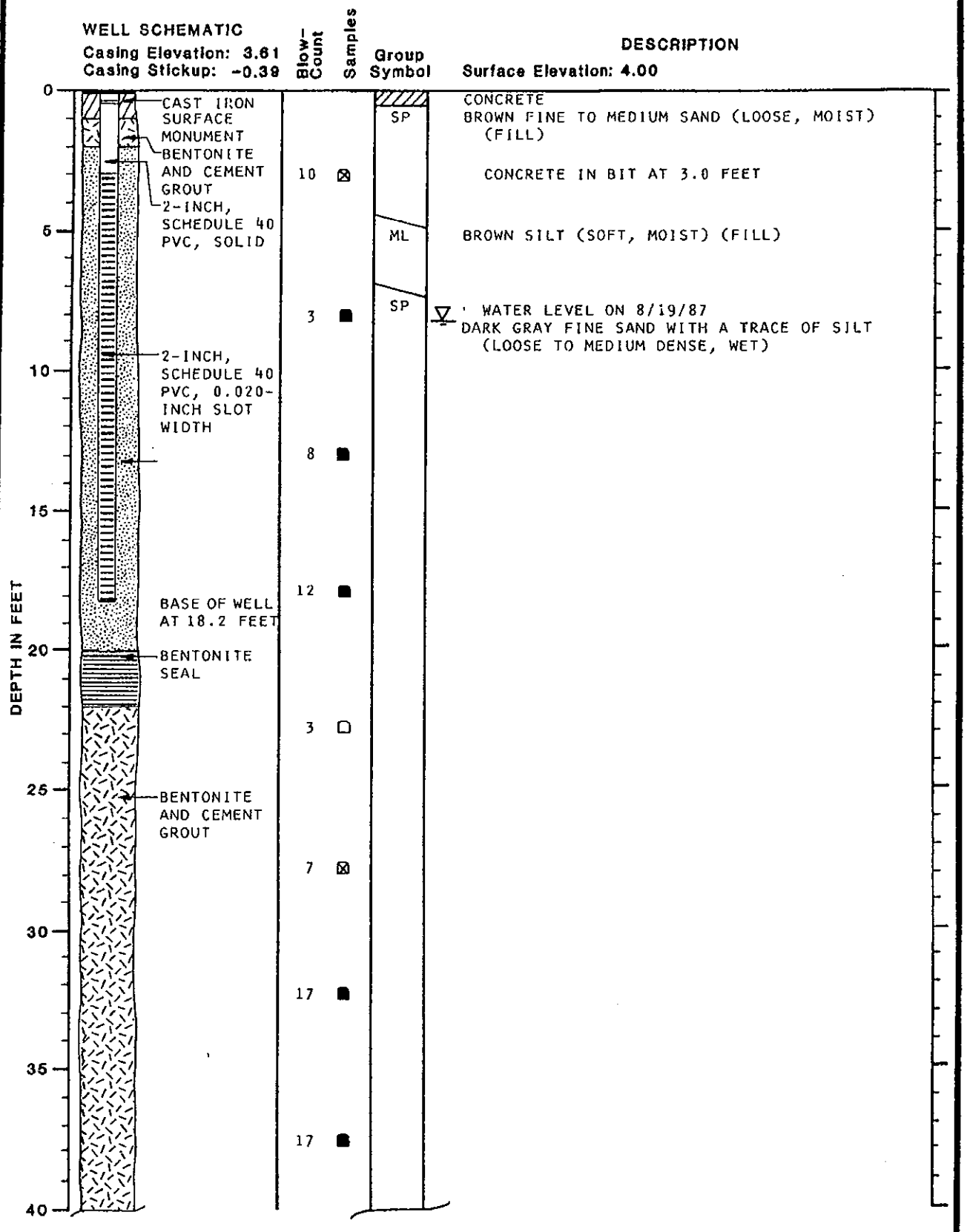
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-17

0929-06-4 SEW:EL:KKT 9-4-87

MONITOR WELL NO. MW-20



Note: See Figure A-2 for Explanation of Symbols

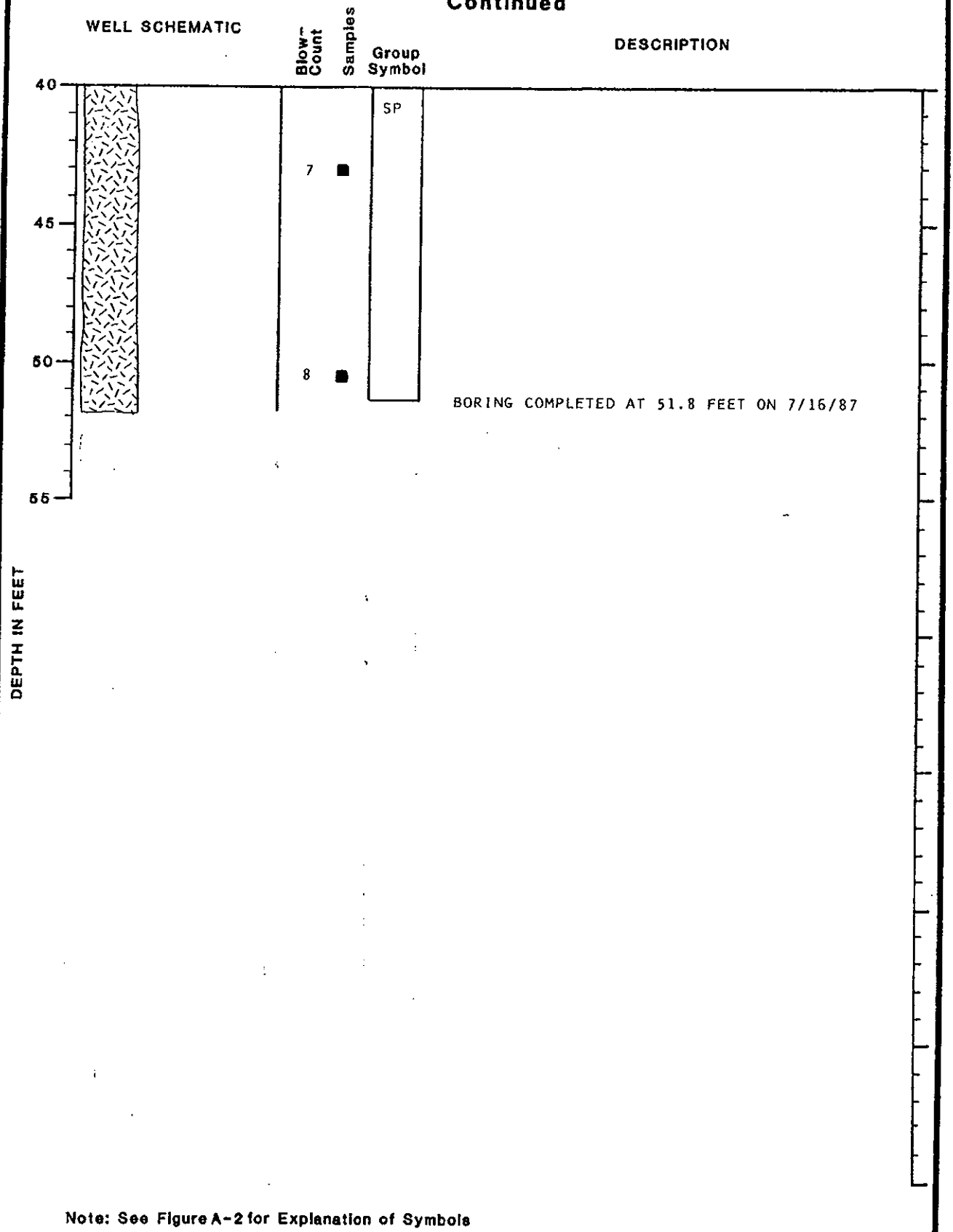
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-18A

0929-06-4 SEW:EL:KKT 9-4-87

MONITOR WELL NO. MW-20
Continued



Note: See Figure A-2 for Explanation of Symbols

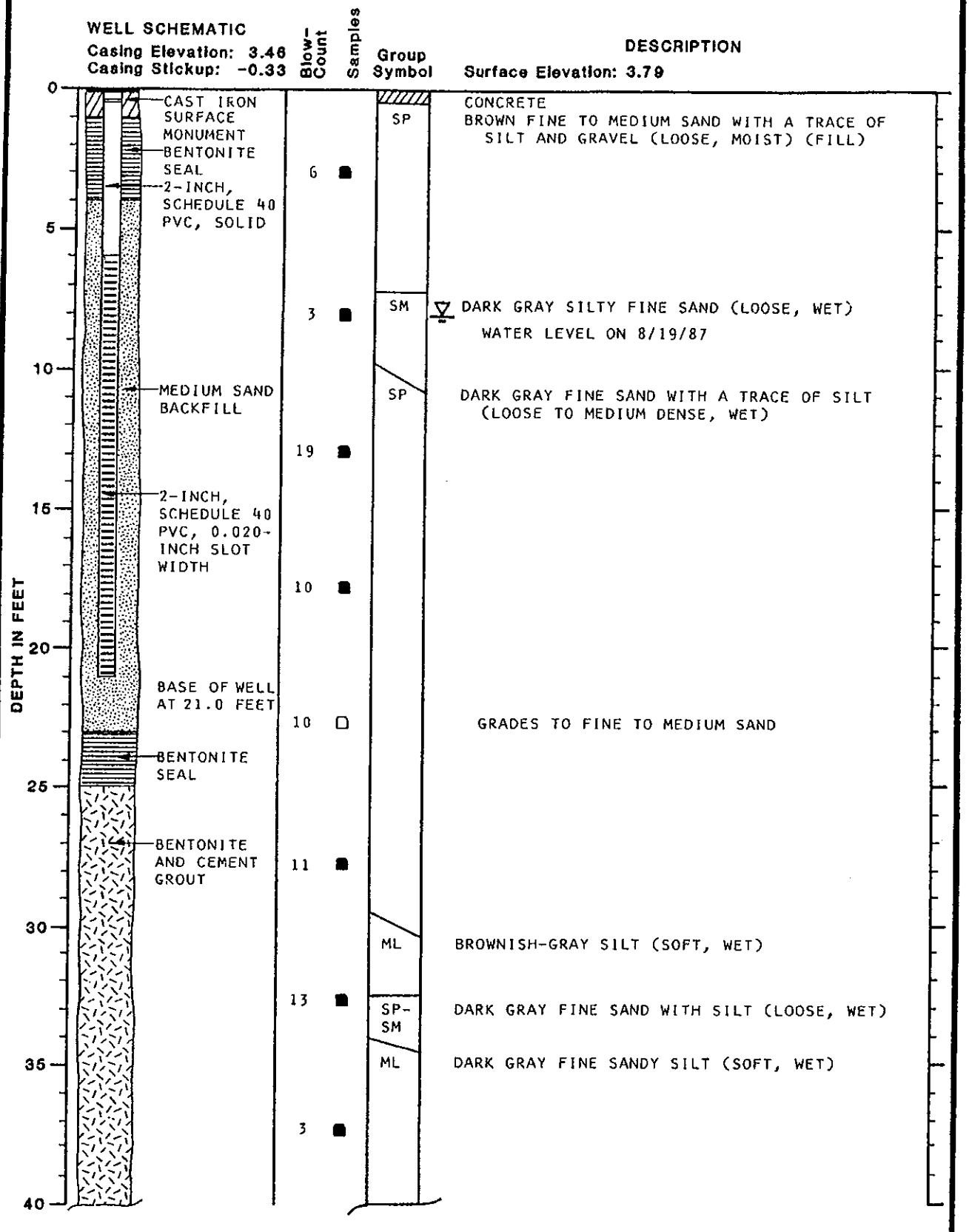
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-18B

0929-06-4 SEW:EL:KKT 9-4-87

MONITOR WELL NO. MW-21



Note: See Figure A-2 for Explanation of Symbols

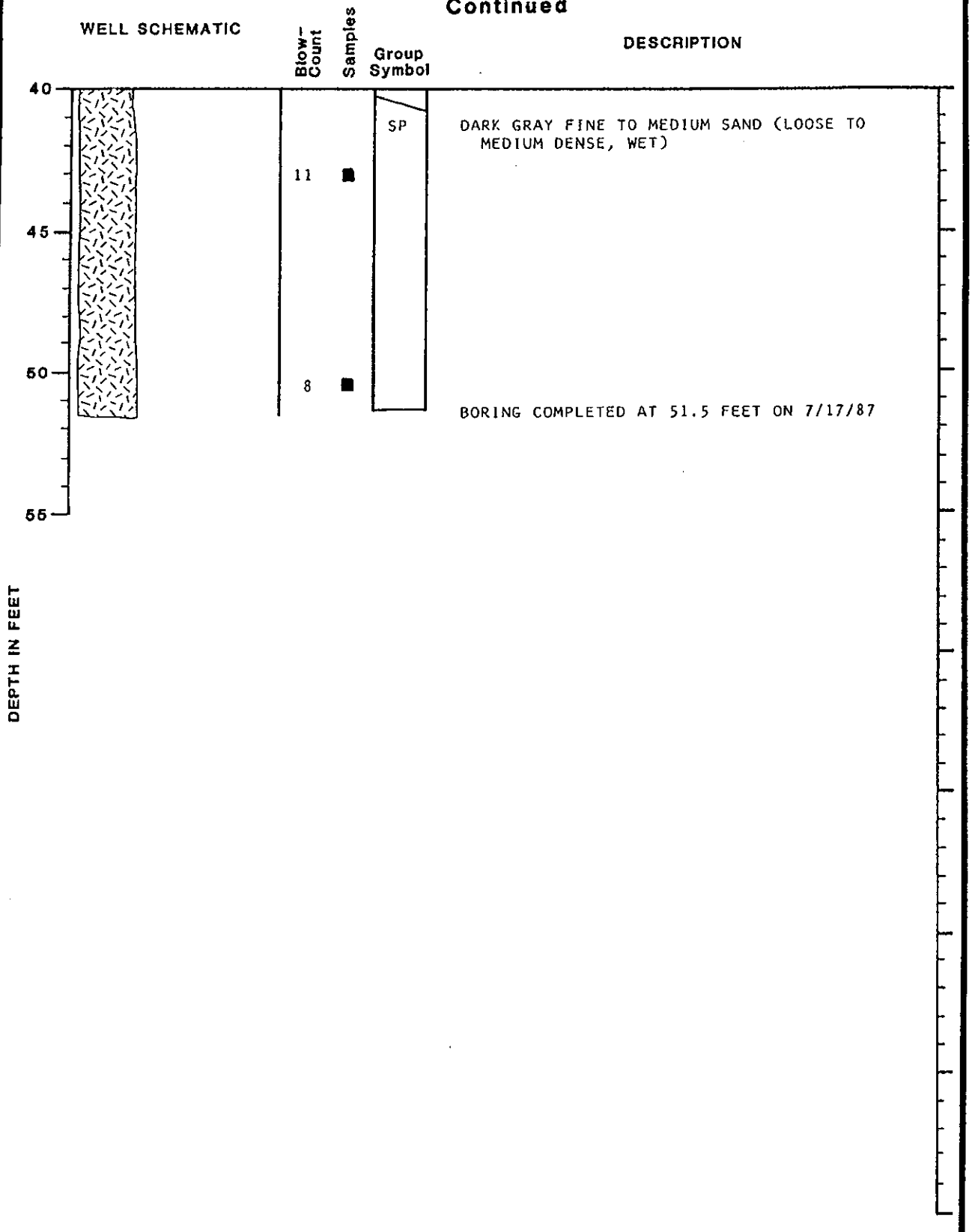
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-19A

0929-06-4 SEW:EL:KKT 9-4-87

MONITOR WELL NO. MW-21
Continued



Note: See Figure A-2 for Explanation of Symbols

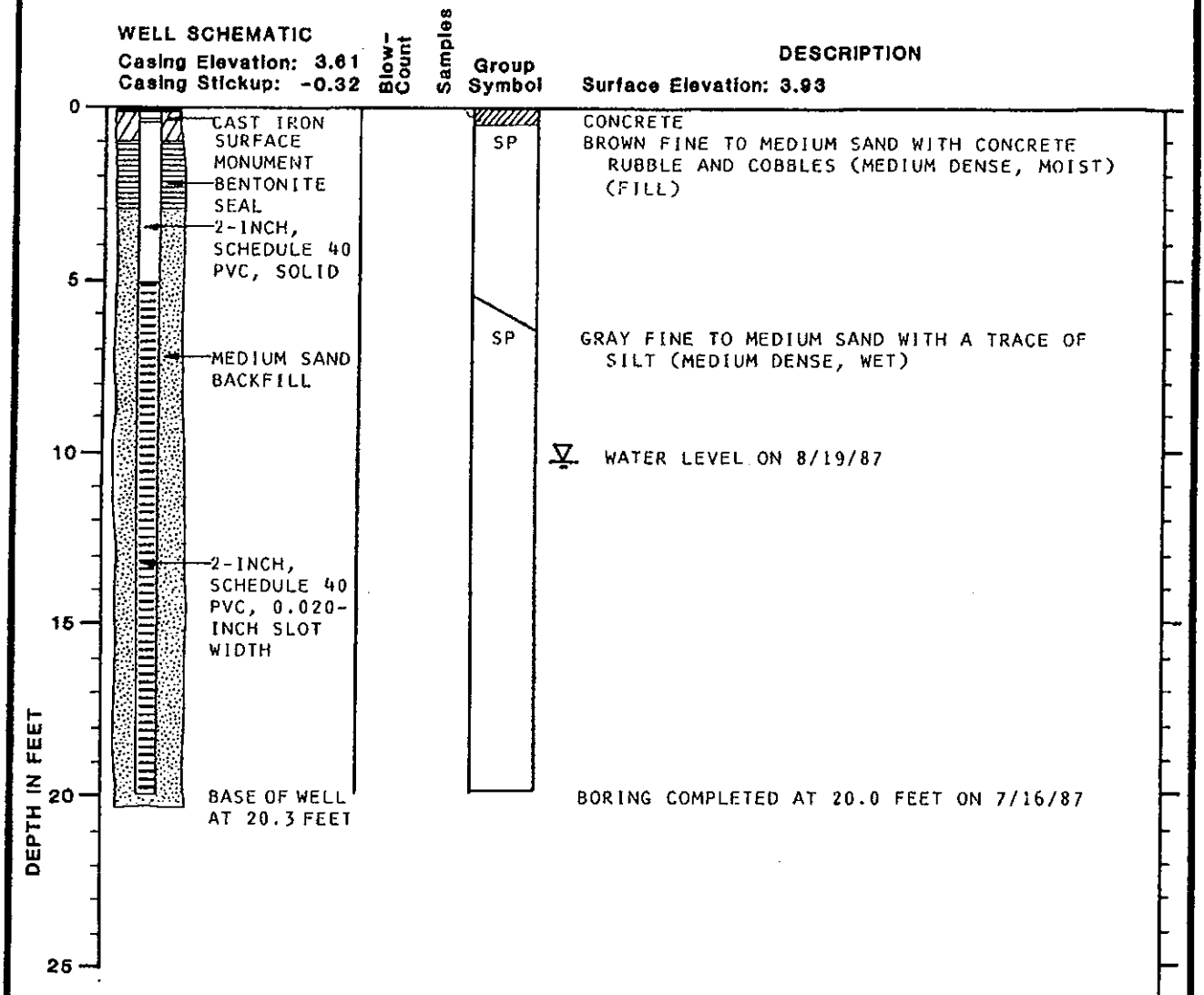
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-19B

0929-06-4 SEW:EL:KKT 9-4-87

MONITOR WELL NO. MW-22



Note: See Figure A-2 for Explanation of Symbols

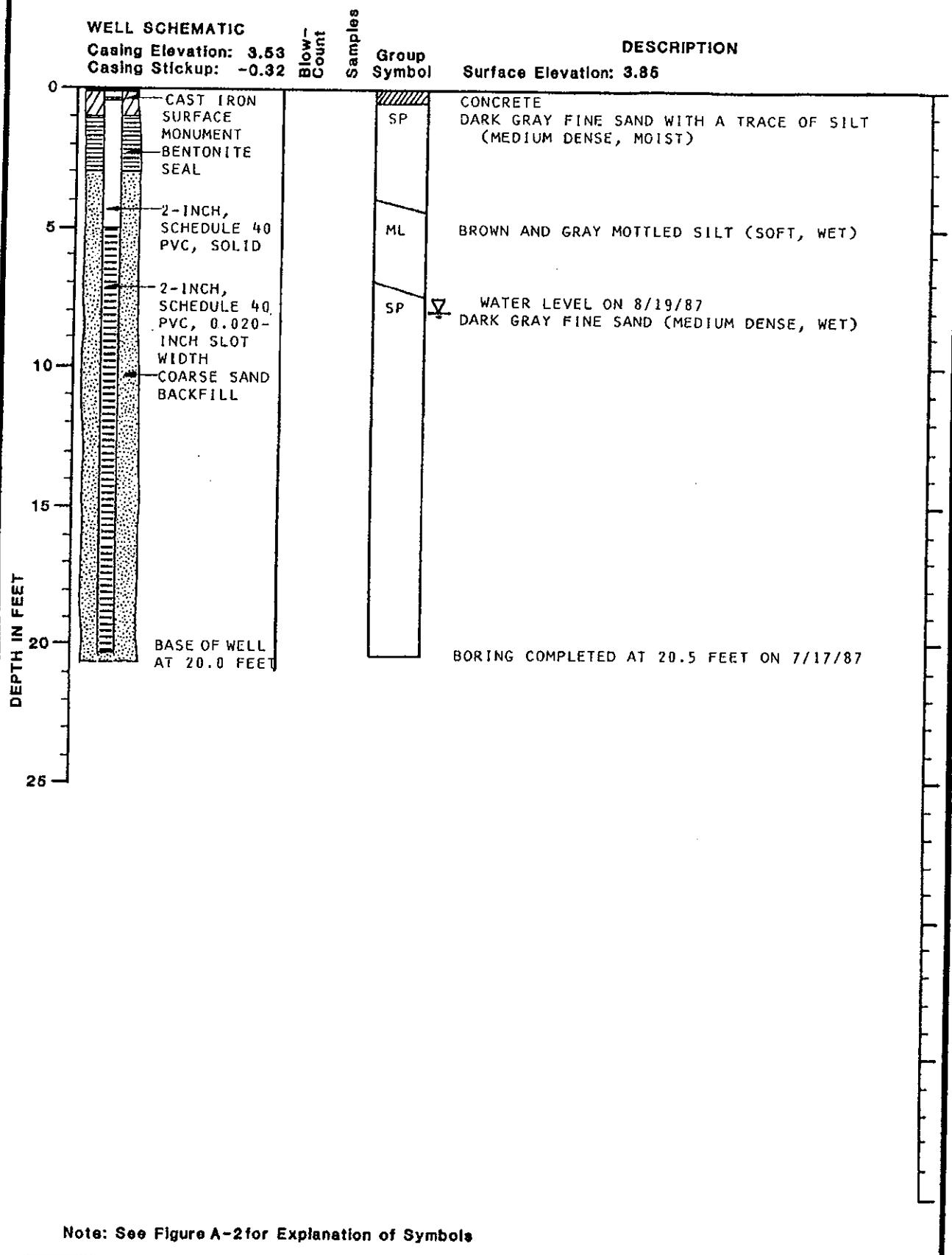
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-20

0929-06-4 SEW:EL:KKT 9-4-87

MONITOR WELL NO. MW-23



Note: See Figure A-2 for Explanation of Symbols

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-21

0929-06-4 SEW:EL:KKT 9-4-87

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	NORTH FIRE ISLE
DRILLING COMPANY	TACOMA PUMP AND DRILLING, INC.
DRILLER	MIKE BRANKLINE
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE:	9-INCH O.D.

		FROM	TO	FT.
ISOLATION CASING	NONE			
BLANK CASING	2-INCH 316 STAINLESS STEEL	0.3	20.3	FT.
PERFORATED CASING	2-INCH 316 STAINLESS STEEL (0.010" SLOT)	20.3	25.3	FT.
SIZE AND TYPE OF FILTER PACK	COLORADO SILICA (#10-20)	15.0	25.5	FT.
SEAL	BENTONITE CHIPS (3/4-INCH)	1.0	15.0	FT.
GROUT	NONE			FT.

Boring/Well Name	MW-24A
Project Name	KENWORTH - SEATTLE
Project Number	956085.03
ELEVATION AND DATUM	9.09 (ALUM.)
TOTAL DEPTH	25.5
DATE STARTED	04/15/1997
DATE COMPLETED	04/15/1997
INITIAL WATER DEPTH (FT)	7.4
LOGGED BY	DON HANSON
SAMPLING METHODS	SPLIT SPOONS
WELL COMPLETION	■ SURFACE HOUSING ☐ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
			0						**8-inches concrete**
									Poorly graded SAND with silt
									Mottled yellowish brown and grayish brown fine sand. Some siltier (SM) and cleaner (SP) intervals, moist, medium dense, no odors
S	1.2	8 14 12	5	MW-24a-5.0		10		SP/ SM	
				Water Level 7.4 feet 4/15/97					
S	1.0	2 3 4	10			15			At 11 ft., grades to more uniform grayish brown, more uniform silt content, wet, slight chemical odor
									Poorly graded SAND
S	0.8	16 12 18	15			3		SP	Very dark gray fine to medium sand with a trace of silt interlayered with grayish brown fine sand with silt, wet, very loose, slight chemical odor
									At 17 ft. driller begins adding water to casing to fight heaving sand
S	1.0	19 20 25	20			4			At 21 ft. a slight chemical/sweet odor
S	0.6	42 32 38				3		SP/ SM	**Poorly graded SAND with silt**
			25						Interlayered very dark grayish brown medium sand and grayish brown fine sand with silt, wet, medium dense, no odors
									At 24.5 becomes cleaner, silt content decreases, wet, no odors.
			30						

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	WEST END – NORTH FIRE ISLE
DRILLING COMPANY	CASCADE DRILLING, INC.
DRILLER	BRENT MALOW
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE	9-INCH O.D.

		FROM	TO	FT.
ISOLATION CASING	NONE			
BLANK CASING	2-INCH SCHEDULE 40 PVC	0.5	13.0	
PERFORATED CASING	2-INCH SCHEDULE 40 PVC (0.010" SLOT)	13.0	23.0	
SIZE AND TYPE OF FILTER PACK	LONESTAR LAPIS LUSTRE #2/12 SAND	10.0	29.0	
SEAL	BENTONITE CHIPS	1.0	10.0	
GROUT	NONE			

Boring/Well Name MW-25A

Project Name KENWORTH – SEATTLE

Project Number 956085.03

ELEVATION AND DATUM: 8.75	TOTAL DEPTH: 29.0
DATE STARTED: 04/09/1997	DATE COMPLETED: 04/09/1997
INITIAL WATER DEPTH (FT): 9.3	
LOGGED BY: DON HANSON	
SAMPLING METHODS: 2.5" SPLIT SPOONS	WELL COMPLETION: ■ SURFACE HOUSING; ▭ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									Concrete, 8 inches, pre-cored
								SM	**Silty SAND** Grayish brown, mostly fine sand, moist, no odors
			5					SM	
S	1.5	5 5 5				0		SP	**Silty SAND/sandy SILT** grayish brown, alternating layers of fine to med. sand (4–5" thick) and sandy silt (2–3" thick), moist, very loose, no odors
				Water Level 9.3 feet 4/10/97					
S	1.5	6 5 6	10			0		SP	**Poorly graded SAND** Reddish brown, fine to medium sand, trace of silt, moist, very loose, no odors
								SP/ SM	
S	1.2	5 4 4	15			0			**Poorly graded SAND** Reddish brown, fine to medium sand, trace of silt, moist, very loose, no odors
S	1.0	7 8 7				0			
									Poorly graded SAND with silt Very dark gray fine sand interbeded with wood chips and sawdust layers (2–3" thick), wet, very loose, no odors
S		4 5 6	20			0		SP	
S									**Poorly graded SAND** Very dark gray, mostly fine to medium sand, interbeded with siltier sand layers and trace layers of wood debris, moist, very loose, no odors
			25						
S	1.2								At 17 ft. becomes wet, no odors
			30						From 26 ft. to 29 ft. wood fragments decrease, no odors

Note:

1) The augers were raised to 24 feet to install the monitoring well and the borehole caved in from 24 to 29 feet.

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	INSIDE PLASTIC SHOP
DRILLING COMPANY	CASCADE DRILLING, INC.
DRILLER	BRENT MALOW
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE	9-INCH O.D.

		FROM	TO	FT.
ISOLATION CASING	NONE			
BLANK CASING	2-INCH SCHEDULE 40 PVC		0.5 TO 10.0	FT.
PERFORATED CASING	2-INCH SCHEDULE 40 PVC (0.010" SLOT)		10.0 TO 20.0	FT.
SIZE AND TYPE OF FILTER PACK	LONESTAR LAPIS LUSTRE #2/12 SAND		8.0 TO 22.5	FT.
SEAL	BENTONITE CHIPS		1.0 TO 8.0	FT.
GROUT	NONE			FT.

Boring/Well Name	MW-26A
Project Name	KENWORTH - SEATTLE
Project Number	956085.03
ELEVATION AND DATUM	8.85
TOTAL DEPTH	22.5
DATE STARTED	04/09/1997
DATE COMPLETED	04/09/1997
INITIAL WATER DEPTH (FT)	8.8
LOGGED BY	DON HANSON
SAMPLING METHODS	2.5" SPLIT SPOONS
WELL COMPLETION	SURFACE HOUSING; STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								ML	**Concrete, 6-inches, pre-cored**
								SM	**Sandy SILT** Yellowish brown with a trace of roots, moist, no odors
S	1.5	3 3 5	5			0			**Silty SAND** Yellowish brown, mostly fine sand, moist, no odors
					Water Level 8.8 feet 4/9/97			ML	
S	1.2	2 16 19	10			0			**Sandy SILT/Silty SAND** Mottled dark gray sandy silt interbeded with 4-6" thick layers of dark yellowish brown silty fine sand, moist, very loose, no odors
								SP	
S	1.2	4 6 7	15			0			**Poorly graded SAND** Dark grayish brown fi-med sand interbeded with 1" thick layers of grayish brown sandy silt approximately every 6", wet, medium dense, no odors
								SP	
			20						**Poorly graded SAND** Very dark grayish brown fine to medium sand, wet, loose, no odors
			25						

Boring & Well Construction Log — Kennedy/Jenks Consultants

BORING LOCATION	PLASTIC SHOP		
DRILLING COMPANY	TACOMA PUMP AND DRILLING, INC.	DRILLER	MIKE BRANKLINE
DRILLING METHOD	HOLLOW STEM AUGER	DRILL BIT(S) SIZE:	9-INCH O.D.

		FROM	TO	FT.
ISOLATION CASING	NONE			
BLANK CASING	2-INCH SCHEDULE 40 PVC	0.5	35.0	
PERFORATED CASING	2-INCH SCHEDULE 40 PVC (0.010" SLOT)	35.0	40.0	
SIZE AND TYPE OF FILTER PACK	COLORADO SILICA SAND (#10-20)	33.0	40.0	
SEAL	BENTONITE CHIPS (3/4-INCH)	1.5	33.0	
GROUT	NONE			

Boring/Well Name MW-26B

Project Name KENWORTH - SEATTLE

Project Number 956085.03

ELEVATION AND DATUM: 8.92	TOTAL DEPTH: 40.0
DATE STARTED: 04/15/1997	DATE COMPLETED: 04/16/1997
INITIAL WATER DEPTH (FT)	
LOGGED BY: DON HANSON	
SAMPLING METHODS: SPLIT SPOONS	WELL COMPLETION: ■ SURFACE HOUSING; ▭ STAND PIPE _____ FT.

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
			0					ML	**Concrete, 6-inches, pre-cored**
								SM	**Sandy SILT** Yellowish brown with a trace of roots, moist, no odors
			5					ML	**Silty SAND** Yellowish brown, mostly fine sand, moist, no odors
			10					SP	**Sandy SILT/Silty SAND** Mottled dark gray sandy silt interbeded with 4-6" thick layers of dark yellowish brown silty fine sand, moist, very loose, no odors
			15					SP	**Poorly graded SAND** Dark grayish brown fi-med sand interbeded with 1" thick layers of grayish brown sandy silt approximately every 6", wet, medium dense, no odors
			20						**Poorly graded SAND** Very dark grayish brown fine to medium sand, wet, loose, no odors
			25						
			30						From 30 to 40 feet lithology was inferred from cuttings and drilling conditions

Boring & Well Construction Log — Kennedy/Jenks Consultants

Project Name KENWORTH – SEATTLE **Project Number** 956085.03 **Boring/Well Name** MW-26B

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
O	0.5	PUSH				0		SP	
			35						
			40					ML	**Sandy SILT** Very dark gray, approximately 60% silt, 40% fine sand, medium density, no odors

Notes:

1) Sampling was not conducted below 30 feet due to heaving sand in the augers.

Boring & Well Construction Log — Kennedy/Jenks Consultants

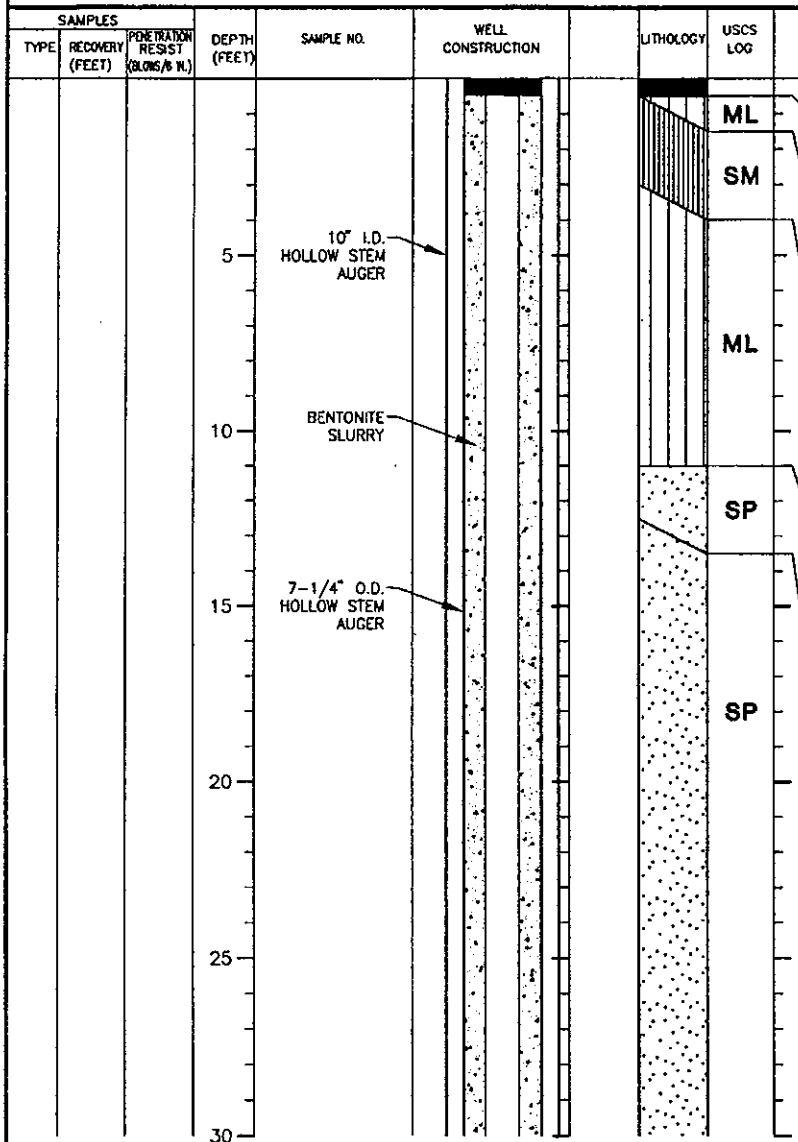
BORING LOCATION	PLASTIC SHOP		
DRILLING COMPANY	HOLT DRILLING, INC.	DRILLER	MIKE BRANKLINE
DRILLING METHOD	HOLLOW STEM AUGER	DRILL BIT(S) SIZE:	9-INCH O.D.
ISOLATION CASING	10-INCH I.D. HOLLOW STEM AUGER	FROM 0.0 TO 42.0 FT.	
BLANK CASING	2-INCH SCHEDULE 40 PVC	FROM 0.0 TO 49.0 FT.	
PERFORATED CASING	2-INCH SCH 40 PVC (0.010" SLOT)	FROM 49.0 TO 59.0 FT.	
SIZE AND TYPE OF FILTER PACK	COLORADO SILICA SAND (#10-20)	FROM 46.0 TO 60.0 FT.	
SEAL	BENTONITE CHIPS	FROM 43.0 TO 46.0 FT.	
GROUT	QUIK-GROUT BENTONITE SLURRY	FROM 0.0 TO 43.0 FT.	

Boring/Well Name MW-26C

Project Name KENWORTH - SEATTLE

Project Number 956085.03

ELEVATION AND DATUM: 8.94 FEET MSL	TOTAL DEPTH: 60.0
DATE STARTED: 06/05/1997	DATE COMPLETED: 06/05/1997
INITIAL WATER DEPTH (FT): 50.0	
LOGGED BY: DON HANSON	
SAMPLING METHODS: 1.5" SPLIT SPOONS	WELL COMPLETION: ■ SURFACE HOUSING; ☐ STAND PIPE ____ FT.



Concrete, 6-inches, pre-cored

Sandy SILT

Yellowish brown with a trace of roots, moist, no odors

Silty SAND

Yellowish brown, mostly fine sand, moist, no odors

Sandy SILT/Silty SAND

Mottled dark gray sandy silt interbeded with 4-6" thick layers of dark yellowish brown silty fine sand, moist, very loose, no odors

Poorly graded SAND

Dark grayish brown fi-med sand interbeded with 1" thick layers of grayish brown sandy silt approximotely every 6", wet, medium dense, no odors

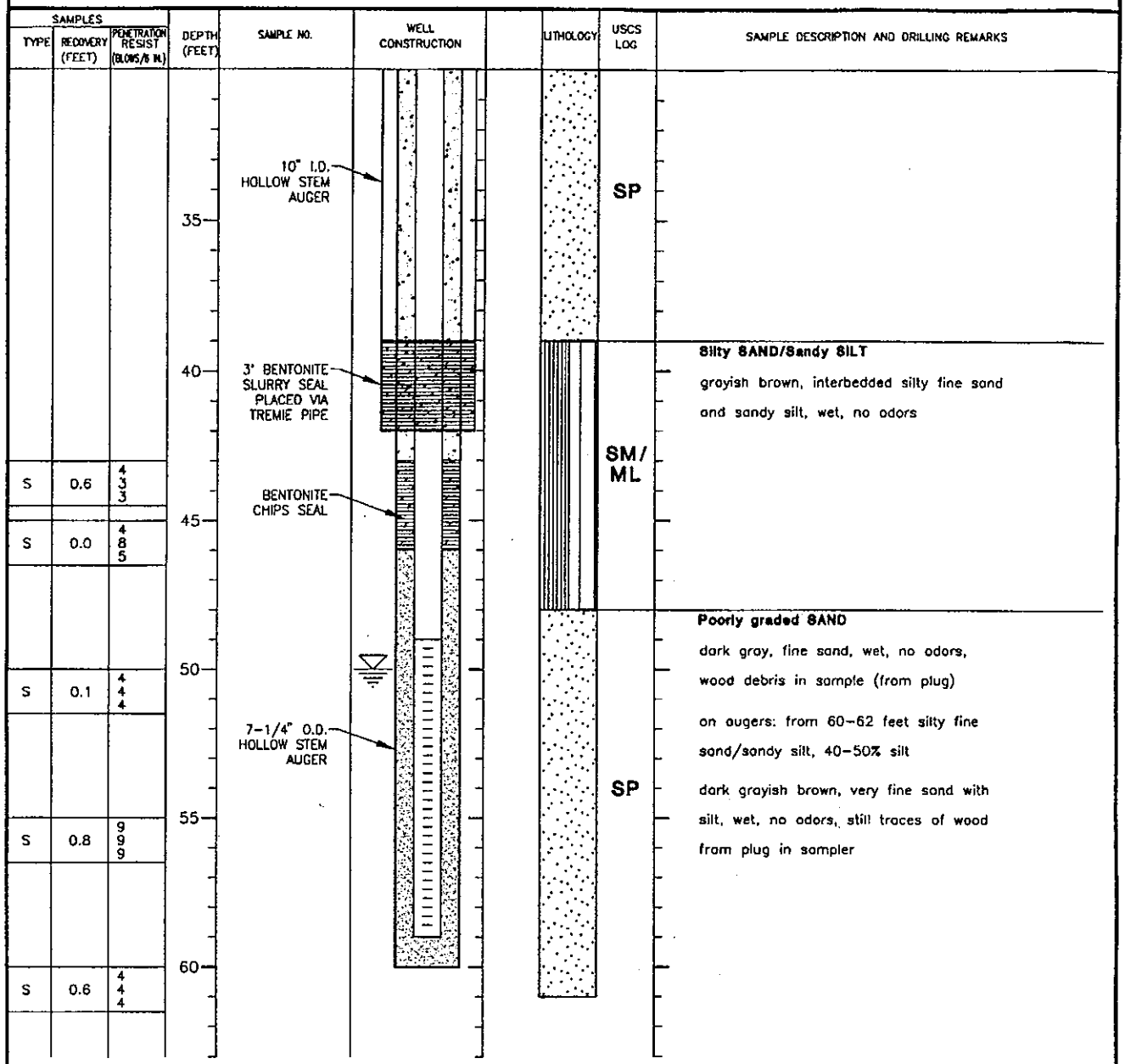
Poorly graded SAND

Very dark grayish brown fine to medium sand, wet, loose, no odors

From 30 to 40 feet lithology was inferred from cuttings and drilling conditions

Boring & Well Construction Log — Kennedy/Jenks Consultants

Project Name KENWORTH – SEATTLE **Project Number** 956085.03 **Boring/Well Name** MW-26C



Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	WEST OF PARTS WAREHOUSE
DRILLING COMPANY	CASCADE DRILLING, INC.
DRILLER	RODNEY LA BROSSE
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE:	9-INCH O.D.

Boring/Well Name MW-27A
Project Name KENWORTH - SEATTLE
Project Number 956085.03

	FROM	TO	FT.
ISOLATION CASING: NONE			
BLANK CASING: 2-INCH 316 STAINLESS STEEL	0.5	20.5	
PERFORATED CASING: 2-INCH 316 STAINLESS STEEL (0.010" SLOT)	20.5	25.5	
SIZE AND TYPE OF FILTER PACK: LONESTAR LAPIS LUSTRE SAND #2/12	15.0	25.5	
SEAL: BENTONITE CHIPS	1.5	15.0	
GROUT: NONE			

ELEVATION AND DATUM: 8.56 (ALUM.)	TOTAL DEPTH: 25.5
DATE STARTED: 04/14/1997	DATE COMPLETED: 04/14/1997
INITIAL WATER DEPTH (FT): 7.8	
LOGGED BY: DON HANSON	
SAMPLING METHODS: SPLIT SPOONS	WELL COMPLETION: ■ SURFACE HOUSING; □ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								GP/GM	**6 inches pre-cored concrete**
									Poorly graded GRAVEL with silt and sand
								SP/SM	Brown, coarse gravel fill, moist, no odors
			5						**Poorly graded SAND with silt**
S	1.5	5 7 8				2			Yellowish brown fine sand, moist, no odors
				Water Level 7.8 feet 4/14/97					**Poorly graded SAND**
									Mottled yellowish brown and gray fine sand,
			10						trace of med. sand and silt, moist, no odors
S	1.2	6 8 10				47			At 10.5: grayish brown, mostly fine to
								SP	medium sand, wet, slight chemical odor
S	1.0	15 18 27				17			At 13 Ft.: grades to dark grayish brown,
									traces of sandy silt nodules, sand
			15						stratified in horizontal layers, wet,
S	1.2	6 15 26				6			chemical odor
									17': driller begins to fight heaving sands
S	1.2	15 29 42				3			18': mostly med. sand, no silt nodules, less
									chemical odor
			20						
S	1.5	19 28 34				1		SP/SM	**Poorly graded SAND with silt**
									Very dark brown medium sand, silt is in thin
S	1.5	19 28 34				1		SW	lenses/inclusions, trace of coarse sand,
									wet, slight chemical odor
			25						**Well-graded SAND**
									Very dark brown fine to coarse sand, wet,
									slight chemical odor

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	INSIDE HI-BAY
DRILLING COMPANY	CASCADE DRILLING, INC.
DRILLER	RODNEY LA BROSSE
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE	9-INCH O.D.

		FROM	TO	FT.
ISOLATION CASING	NONE			
BLANK CASING	2-INCH 316 STAINLESS STEEL	0.3	15.3	
PERFORATED CASING	2-INCH 316 STAINLESS STEEL (0.010" SLOT)	15.3	20.3	
SIZE AND TYPE OF FILTER PACK	LONESTAR LAPIS LUSTRE #2/12 SAND	13.0	20.5	
SEAL	BENTONITE CHIPS	1.5	13.0	
GROUT	NONE			

Boring/Well Name	MW-28A
Project Name	KENWORTH - SEATTLE
Project Number	956085.03
ELEVATION AND DATUM	8.68 (ALUM.)
TOTAL DEPTH	20.5
DATE STARTED	04/14/1997
DATE COMPLETED	04/14/1997
INITIAL WATER DEPTH (FT)	7.8
LOGGED BY	DON HANSON
SAMPLING METHODS	SPLIT SPOONS
WELL COMPLETION	SURFACE HOUSING; STAND PIPE ____ FT.

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									9-inches pre-cored concrete
								SP	**Poorly graded SAND** Yellowish brown medium sand interstratified with lenses of sandy silt, moist, no odors
U			5						
								ML	**Sandy SILT** Mottled yellowish red and brown sandy silt, interstratified with .5" to 2" thick layers of clean medium sand from 6.5 ft to 7.5 ft., moist, medium stiff, no odors
S	1.0	5 6 8		Water Level 7.8 feet 4/14/97				SM	
U	1.0	6 8 9	10						**Silty SAND** Yellowish brown silty fine sand, interstratified with layers of clean fine sand wet, medium stiff, no odors
			15					SP	**Poorly graded SAND** Very dark gray fine sand with a trace of silt, wet, medium dense, slight chemical odor At 18 ft., grades to mostly fine-medium sand, wet, very slight chemical odor
			20						Lithology based on boring for well MW-28b.

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	INSIDE HI-BAY
DRILLING COMPANY	CASCADE DRILLING, INC.
DRILLER	RODNEY LA BROSSE
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE:	9-INCH O.D.

		FROM	TO	FT.
ISOLATION CASING	NONE			
BLANK CASING	2-INCH 316 STAINLESS STEEL	0.3	35.3	
PERFORATED CASING	2-INCH 316 STAINLESS STEEL (0.010" SLOT)	35.3	40.3	
SIZE AND TYPE OF FILTER PACK	LONESTAR LAPIS LUSTRE #2/12 SAND	33.0	40.5	
SEAL	BENTONITE CHIPS	1.5	33.0	
GROUT	NONE			

Boring/Well Name	MW-28B
Project Name	KENWORTH - SEATTLE
Project Number	956085.03
ELEVATION AND DATUM	8.39 (ALUM.)
TOTAL DEPTH	40.5
DATE STARTED	04/14/1997
DATE COMPLETED	04/14/1997
INITIAL WATER DEPTH (FT)	7.8
LOGGED BY	DON HANSON
SAMPLING METHODS	SPLIT SPOONS
WELL COMPLETION	■ SURFACE HOUSING ▭ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									9-inches pre-cored concrete
								SP	**Poorly graded SAND** Yellowish brown medium sand interstratified with lenses of sandy silt, moist, no odors
S	1.5	4 5 6	5			3		ML	**Sandy SILT** Mottled yellowish red and brown sandy silt, interstratified with .5" to 2" thick layers of clean medium sand from 6.5 ft to 7.5 ft., moist, medium stiff, no odors
S	1.5	5 5 6		Water Level 7.8 feet 4/14/97		8		SM	
S	1.2	6 8 11	10			35			**Silty SAND** Yellowish brown silty fine sand, interstratified with layers of clean fine sand wet, medium stiff, no odors
S	1.0	11 18 26				49			
S	1.2	10 14 19	15			56			**Poorly graded SAND** Very dark gray fine sand with a trace of silt, wet, medium dense, slight chemical odor
S	1.5	14 20 32				3		SP	At 18 ft., grades to mostly fine-medium sand, wet, very slight chemical odor
S	1.2	25 30 38	20			6			At 20 ft., trace of yellowish brown silt/clay nodules, slight organic odor
S	1.2	21 22 25				18			At 23 ft., grades to mostly medium sand, slight chemical odor
S	1.2	42 40 50/4	25			5			
S	1.2	22 52 41				0		SP/ SM	**Poorly graded SAND with silt** Very dark grayish brown sand interstratified with 1-4 inch layers of sandy silt, 60% sand, 40% silt, wet, no odors
			30			2			

Boring & Well Construction Log — Kennedy/Jenks Consultants

Project Name KENWORTH – SEATTLE **Project Number** 956085.03 **Boring/Well Name** MW-28B

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
S	1.5	13 30 39				2			30–31 ft. clean sand layer, driller begins adding water to augers to prevent sand heave
S	1.2	11 36 39				2			Grades to mostly silt interstratified with sand from 34 to 39 feet
S	1.2	11 24 32				2		SP/ SM	
S	1.0	16 20 27	35			0			
S	1.5	18 24 38				2			
S	1.2	10 12 15				2			
S	1.2	15 18 29	40			2		SM	**Silty SAND/Sandy SILT** Very dark gray, approximately 50% silty fine sand and 50% sandy silt, wet, medium dense, no odors

Boring & Well Construction Log — Kennedy/Jenks Consultants

BORING LOCATION	FORMER HOOD STORAGE AREA
DRILLING COMPANY	CASCADE DRILLING, INC.
DRILLER	BRIAN GOSE
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE	9-INCH O.D.
ISOLATION CASING	NONE
BLANK CASING	2-INCH SCHEDULE 40 PVC
PERFORATED CASING	2-INCH SCHEDULE 40 PVC (0.010" SLOT)
SIZE AND TYPE OF FILTER PACK	LONESTAR LAPIS LUSTRE #2/12 SAND
SEAL	BENTONITE CHIPS
GROUT	

	FROM	TO	FT.
ISOLATION CASING			
BLANK CASING	0.5	15.0	
PERFORATED CASING	15.0	25.0	
SIZE AND TYPE OF FILTER PACK	12.0	49.5	
SEAL	1.0	12.0	
GROUT			

Boring/Well Name MW-29A
Project Name KENWORTH - SEATTLE
Project Number 956085.03

ELEVATION AND DATUM: 8.76	TOTAL DEPTH: 49.5
DATE STARTED: 04/08/1997	DATE COMPLETED: 04/08/1997
INITIAL WATER DEPTH (FT): 8.5	
LOGGED BY: DON HANSON	
SAMPLING METHODS: 2.5" SPLIT SPOONS	WELL COMPLETION: ■ SURFACE HOUSING; ▭ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SP/SM	**6-inches pre-cored concrete** **Poorly graded SAND with silt** Brown, mostly fine sand, moist, no odors
								SP	
S	1.4	12 10 12	5					ML	**Poorly graded SAND** Brown, mostly fine sand, trace of silt, moist, no odors,
				Water Level 8.5 feet 4/8/97				SP/SM	**Sandy SILT** Yellowish brown, sand is mostly fine, moist, stiff, no odors
S	1.3	16 28 30	10			2			
S	1.0	12 20 25							**Poorly graded SAND with silt** Dark yellowish brown fine sand, moist, no odors
S	1.0	8 14 14	15			2			
S	1.5	14 17 20				2		SP	**Poorly graded SAND** Mottled dark yellowish brown and yellowish red, fine-med. sand interbedded about every 2.5 to 5 feet with .5 to 1.5' thick layers of black organic silt and wood debris, moist, medium dense, no odors
S	1.0	15 17 23	20	MW-29A-20.0		--		OL	
S	1.0	15 17 19		MW-29A-22.5		0			**21'-22': Wood/Bark layer** 24.5-25.5: Wood debris layer
S	1.0	23 25 25	25	MW-29A-25.0		2		SW	**Well-graded SAND with gravel** Dark grayish brown, wet, medium dense, no odors
S	1.2	12 21 27				0		SP	**Poorly graded SAND** Dark grayish brown, mostly fine to medium sand with traces of coarse sand and fine gravel, wet, no odors
			30						

Boring & Well Construction Log — Kennedy/Jenks Consultants

Project Name KENWORTH – SEATTLE **Project Number** 956085.03 **Boring/Well Name** MW-29A

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
S	1.0	10 15 15		MW-29a-30.0		0			Thin (<1 ft.) organic silt layer at 29.75 ft.
S	1.0	12 18 23				0			Thin (1/2 cm) silt layers interbeded in sand from 31 to 33 ft.
S	1.0	18 17 18	35			0		SP	
S	1.0					--			
S	1.0	18 17 18	40			0			**Silty SAND/SAND with Silt** Dark grayish brown silty fine sand interbeded with layers of sandy silt, ranging in thickness from 1–2 inches to 2 feet, saturated, loose to medium dense, no odors
S	1.2	14 10 10				0		SM	
S	1.2	14 18 25	45			0			
S	1.5	15 21 25				0		SP/ SM	**Poorly graded SAND with silt** Dark grayish brown fine to medium sand, wet, medium dense, no odors

Notes:

1) The boring was backfilled with bentonite chips from 40 to 49.5 feet. Native soil caved in from 38 to 40 feet. Bentonite chips were used to backfill the boring from 30 to 38 feet.

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: SOUTH OF PLASTICS SHOP NEAR BULKHEAD	**Boring/Well Name** MW-29B
DRILLING COMPANY: CASCADE; DRILLER: JAMES	**Project Name** PACCAR DATA GAPS
DRILLING METHOD: HSA; DRILL BIT(S) SIZE: 9-INCH OD	**Project Number** 016110.00
ISOLATION CASING: FROM TO FT.	ELEVATION AND DATUM; TOTAL DEPTH: 44.0
BLANK CASING: 2" SCHEDULE 40 PVC PIPE — FROM 0.0 TO 34.0 FT.	DATE STARTED: 03/12/2002; DATE COMPLETED: 03/12/2002
PERFORATED CASING: 2" SCHEDULE 40 PVC PIPE (0.010 SLOT) — FROM 34.0 TO 44.0 FT.	INITIAL WATER DEPTH (FT): 8.0
SIZE AND TYPE OF FILTER PACK: LAPIS LUSTRE #2/12 MONTEREY SAND — FROM 32.0 TO 44.0 FT.	LOGGED BY: DKM
SEAL: PURE GOLD BENTONITE CHIPS — FROM 1.0 TO 32.0 FT.	SAMPLING METHODS: SPLIT SPOON; WELL COMPLETION: ■ SURFACE HOUSING, ▭ STAND PIPE ____ FT.
GROUT: CONCRETE (FOR SETTING MONUMENT) — FROM 0.0 TO 1.0 FT.	

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									Concrete
								GM	**Silty GRAVEL with sand** Angular gravel with silt and fine sand
S	1.5	10 8 9				6.3		SP	**Poorly graded SAND** Brown medium- to fine- sand with fine rootlets, no odor.
			5						
S	1.5	5 4 6				1.6		SM	**Silty SAND**
								SP/SM	Brown/orange fine sand and silt mixture, 5% medium sand, no odor.
S	1.5	6 6 7							
			10						
S	1.5	10 12 13				5.7		SP	**Poorly graded SAND with silt** Brown medium- to fine- sand with some silt, no odor.
S	1.5	12 13 18							**Poorly graded SAND** Brown medium sand with 20-30% fine sand, minor silt, no odor.
			15						
S	1.5	10 14 21				4.1			**Poorly graded SAND** Gray poorly graded medium sand. Isolated small silt pockets and banding 12-20 feet, silt <5% total volume. Very minor to no apparent silt 20-39 feet. Driller suspects wood 25-27 feet.
S	1.5	3 7 10							
			20						
S	1.5	50						SP	
S	1.5	60							
			25						
S	1.5	20 20 24							
			30						

Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name PACCAR DATA GAPS **Project Number** 016110.00 **Boring/Well Name** MW-29B

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
S	1.5	9 18 23							
S	1.5	9 21 24							
S	1.5	3 4 12	35						
S	1.5	9 17 15				5.8		SP	
S	1.5	6 12 19						SM	**Silty SAND** Gray fine sand with silt, moderately dense, no odor.
S	1.5	6 6 9	40					SP	**Poorly graded SAND** Gray medium sand, grades to mostly fine sand by 42 feet.
S	1.5	9 15 27						ML	**Sandy SILT** Gray silt with fine sand, moderately dense, no odor.
S	1.5	11 11 13	45						
			50						
			55						
			60						
			65						
			70						

Boring & Well Construction Log

Kennedy/Jenks Consultants

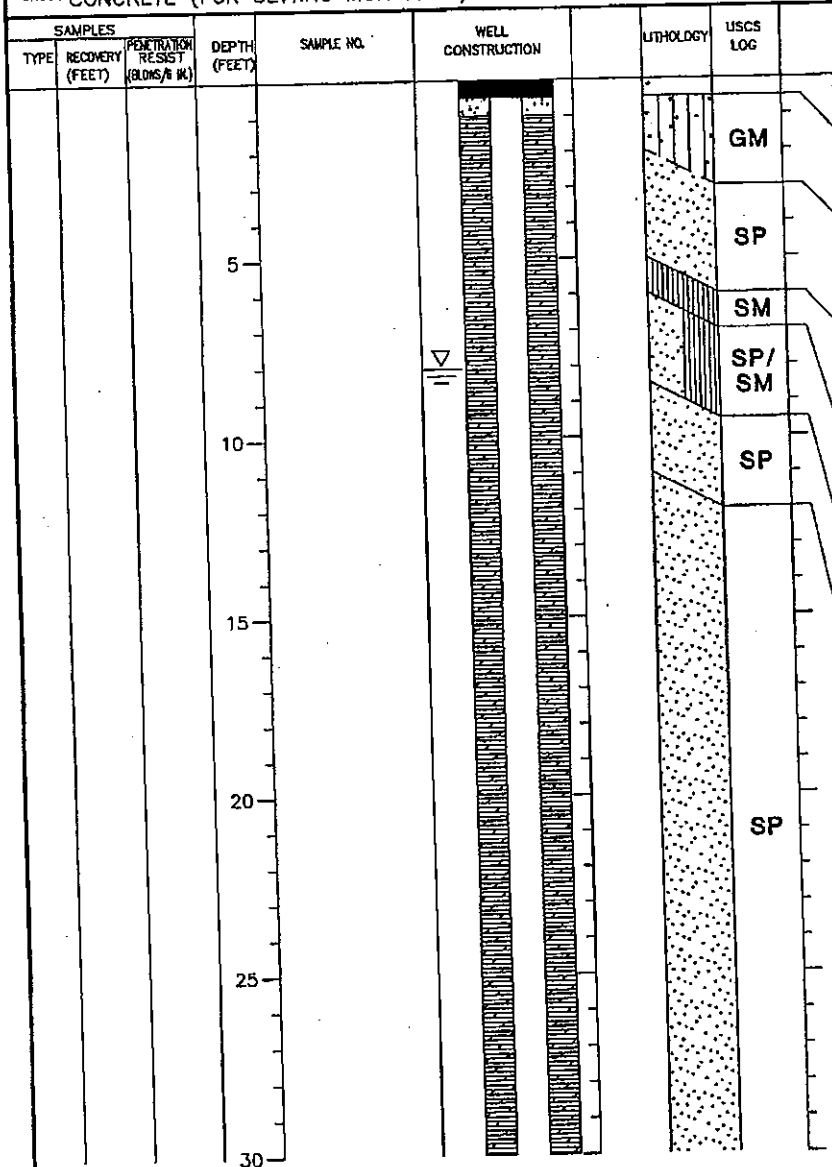
BORING LOCATION	SOUTH OF PLASTICS SHOP NEAR BULKHEAD
DRILLING COMPANY	CASCADE
DRILLER	SCOTT
DRILLING METHOD	HSA
DRILL BIT(S) SIZE	15"/9" OD
ISOLATION CASING	15" OD HSA FLIGHTS (TEMPORARY) FROM 0.0 TO 40.0 FT.
BLANK CASING	2" SCHEDULE 40 PVC PIPE FROM 0.0 TO 49.0 FT.
PERFORATED CASING	2" SCHEDULE 40 PVC PIPE (0.010 SLOT) FROM 49.0 TO 56.0 FT.
SIZE AND TYPE OF FILTER PACK	LAPIS LUSTRE #2/12 MONTEREY SAND FROM 47.0 TO 59.0 FT.
SEAL	PURE GOLD BENTONITE CHIPS FROM 1.0 TO 47.0 FT.
GROUT	CONCRETE (FOR SETTING MONUMENT) FROM 0.0 TO 1.0 FT.

Boring/Well Name MW-29C

Project Name PACCAR DATA GAPS

Project Number 016110.00

ELEVATION AND DATUM	TOTAL DEPTH 59.0
DATE STARTED 03/30/2002	DATE COMPLETED 03/30/2002
INITIAL WATER DEPTH (FT) 8.0	
LOGGED BY DKM	
SAMPLING METHODS SPLIT SPOON	WELL COMPLETION ■ SURFACE HOUSING ☐ STAND PIPE ____ FT.



Concrete

Silty GRAVEL with sand

Angular gravel with silt and fine sand

Poorly graded SAND

Brown medium- to fine- sand with fine rootlets, no odor.

Silty SAND

Brown/orange fine sand and silt mixture, 5% medium sand, no odor.

Poorly graded SAND with silt

Brown medium- to fine- sand with some silt, no odor.

Poorly graded SAND

Brown medium sand with 20-30% fine sand, minor silt, no odor.

Poorly graded SAND

Gray poorly graded medium sand. Isolated small silt pockets and banding 12-20 feet, silt <5% total volume. Very minor to no apparent silt 20-39 feet. Driller suspects wood 25-27 feet.

Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name PACCAR DATA GAPS **Project Number** 016110.00 **Boring/Well Name** MW-29C

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
			35				SP	
S	1.5	6 4 6						
S	1.5	3 2 3	40				ML	**Sandy SILT** Gray/brown texurally layered fine sand with silt and sandy silt, 30% fine sand overall.
S	1.5	4 5 5					ML	**Sandy SILT** Dark gray silt with 15% fine sand.
S	1.5	3 5 8	45				ML	**Sandy SILT** Dark gray silt with 25-30% fine sand overall, texturally layered with fine sandy silt and silty fine sand.
S	1.5	3 5 6						
S	1.5	5 6 6	50				SP	**Poorly graded SAND** Dark gray fine sand with 5% silt in small pods and lenses.
S	1.5	6 8 8						
S	1.5	6 8 8	55				ML	**SILT** Gray silt, moderately dense.
			60				ML	**Sandy SILT** Gray silt with fine sand, texturally layered with silt and silty fine sand, overall 30% fine sand.

Notes:

1. Lithology above 37.5 feet based on boring MW-29B.

2. 15" OD augers used as temporary isolation casing. A 4-foot thick seal of hydrated bentonite chips was set from 36-40 feet. Drilling below 40 feet was done with 9" OD augers through the center of the 15" OD augers.

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	FORMER HAZARDOUS WASTE HANDLING AREA
DRILLING COMPANY	CASCADE DRILLING, INC.
DRILLER	BRIAN GOSE
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE:	9-INCH O.D.

		FROM	TO	FT.
ISOLATION CASING	NONE			
BLANK CASING	2-INCH SCHEDULE 40 PVC		0.3 TO 14.3	FT.
PERFORATED CASING	2-INCH SCHEDULE 40 PVC (0.010" SLOT)		14.3 TO 24.3	FT.
SIZE AND TYPE OF FILTER PACK	LONESTAR LAPIS LUSTRE #2/12 SAND		12.0 TO 28.0	FT.
SEAL	BENTONITE CHIPS		1.5 TO 12.0	FT.
GROUT	NATIVE SOIL		28.0 TO 38.0	FT.

Boring/Well Name	MW-30A
Project Name	KENWORTH - SEATTLE
Project Number	956085.03
ELEVATION AND DATUM	9.73
TOTAL DEPTH	42.5
DATE STARTED	04/08/1997
DATE COMPLETED	04/08/1997
INITIAL WATER DEPTH (FT)	12.3
LOGGED BY	DON HANSON
SAMPLING METHODS	2.5" SPLIT SPOONS
WELL COMPLETION	■ SURFACE HOUSING; ▭ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**4 inches asphalt**
									Silty SAND
								SP/SM	Brown fine to medium sand, moist, no odors
			5						**Poorly graded SAND with silt**
S	1.5	23 29 17				0		SP	Dark yellowish brown, fine to medium sand,
									trace of coarse sand, moist, very dense,
S	0.5	10 10 10				2		SP/SM	no odors
			10						**Poorly graded SAND**
S	1.5	20 30 32				2			Dark yellowish brown fine to medium sand
				Water Level 12.3 feet 4/8/97				SM	with a trace of fines, moist, medium dense,
S	1.0	15 25 27							no odors
			15						**Poorly graded SAND with silt**
S	1.2	7 10 15							Dark brown fine sand, a few cobbles, trace
						2		OL	of wood debris and brick fragments, moist to
S	1.0	8 10 15							wet, loose, slight organic odor
			20			2			**Silty SAND**
S	1.2	8 12 15							Dark gray, fine to medium sand with a few
						7.7			fine to coarse gravel and cobbles, trace of
S	0.1	6 8 8						SP	wood debris, wet, medium dense, no odors
			25			1.5			**Organic SILT with sand**
S	0.4	11 18 16							Black, wet, stiff, organic odor, from 18.5
						1.5			to 19.5 sand content increases
S		12 18 20							**Poorly graded SAND**
			30			1.5			Very dark gray fine to medium sand, wet,
									loose, no odors
									23': Traces small silty sand nodules, wet,
									no odors. Sand flowing up into augers
									25': grades to mostly med. sand, fewer silt nodules
									27': water coming to the surface with soil cuttings

Boring & Well Construction Log — Kennedy/Jenks Consultants

Project Name KENWORTH – SEATTLE **Project Number** 956085.03 **Boring/Well Name** MW-30A

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
S	0.7	18 20 24				1.5			30': Grades to fi–med sand, trace coarse sand
									33': no coarse sand, no odors
S	0.8	9 19 26				– –		SP	35': traces of black organic silt inclusions (1–2 cm diameter)
			35						
S	1.0	19 20 20				0			
S	1.0	10 12 20				0		ML	**Sandy SILT**
								OL	Grayish brown, sand is mostly fine, moist to wet, very stiff, no odors
			40						
S	1.0	13 25 36				1		SP/ SM	**Organic SILT with sand**
S	1.5					1			Black, sand is mostly fine, wet, very stiff, organic odor
			45						**Poorly graded SAND with silt**
									Dark gray fine to medium sand, wet, medium dense, no odors
									41–42': some silty fine sand layers
			50						

Notes:

1) A bentonite seal was installed from 38 to 42.5 feet.

2) Native soil caved in from 28 to 38 feet during backfilling.

Boring & Well Construction Log — Kennedy/Jenks Consultants

BORING LOCATION	WEST OF FRAME RACKS
DRILLING COMPANY	CASCADE DRILLING, INC.
DRILLER	BRENT MALOW
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE	9-INCH O.D.
ISOLATION CASING	NONE FROM TO FT.
BLANK CASING	2-INCH SCHEDULE 40 PVC FROM 0.3 TO 13.0 FT.
PERFORATED CASING	2-INCH SCHEDULE 40 PVC (0.010" SLOT) FROM 13.0 TO 23.0 FT.
SIZE AND TYPE OF FILTER PACK	LONESTAR LAPIS LUSTRE #2/12 SAND FROM 10.0 TO 25.0 FT.
SEAL	BENTONITE FROM 1.5 TO 10.0 FT.
GROUT	NONE FROM TO FT.

Boring/Well Name	MW-31A
Project Name	KENWORTH - SEATTLE
Project Number	956085.03
ELEVATION AND DATUM	8.54
TOTAL DEPTH	25.0
DATE STARTED	04/09/1997
DATE COMPLETED	04/09/1997
INITIAL WATER DEPTH (FT)	7.5
LOGGED BY	DON HANSON
SAMPLING METHODS	2.5" SPLIT SPOONS
WELL COMPLETION	■ SURFACE HOUSING ☐ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									9 inches pre-cored concrete
								GP/GM	**Poorly graded GRAVEL with silt and sand**
									Grayish brown coarse gravel,
			5					ML	moist, no odors, fill
									SILT with sand
				Water Level 7.5 feet 4/9/97					Yellowish brown, sand is mostly fine,
S	1.2	1 1 6				0		SM	moist, no odors
			10						**Silty SAND**
S	1.5	2 2 4				0		SP/SM	Mottled reddish brown and grayish brown
									fi-med sand interlayered with sandy silt,
S	0.8	4 5 4				1			wet, very loose, no odors
			15						**Poorly graded SAND with silt**
S	1.2	4 3 5				1			Grayish brown fi-med sand, wet,
									very loose, no odors
S	0.3					0		SP	**Poorly graded SAND**
			20						Very dark gray fi-med sand, wet,
									very loose, no odors
									17.5': 7' of heave in augers
									18.5': grades to mostly medium sand
									22': A few coarse sand, saturated, flowing
			25						sand. Sample recovery not possible

Notes:

1) Soil sampling beneath approximately 12.5 feet was ineffective due to heaving sand.

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	NORTH FIRE ISLE
DRILLING COMPANY	CASCADE DRILLING, INC.
DRILLER	BRENT MALOW
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE	9-INCH O.D.

		FROM	TO	FT.
ISOLATION CASING	NONE			
BLANK CASING	2-INCH SCHEDULE 40 PVC	0.3	13.0	FT.
PERFORATED CASING	2-INCH SCHEDULE 40 PVC (0.010" SLOT)	13.0	23.0	FT.
SIZE AND TYPE OF FILTER PACK	LONESTAR LAPIS LUSTRE #2/12 SAND	10.0	25.0	FT.
SEAL	BENTONITE CHIPS	1.5	10.0	FT.
GROUT	NONE			FT.

Boring/Well Name MW-32A

Project Name KENWORTH - SEATTLE

Project Number 956085.03

ELEVATION AND DATUM: 8.88	TOTAL DEPTH: 25.0
DATE STARTED: 04/09/1997	DATE COMPLETED: 04/09/1997
INITIAL WATER DEPTH (FT): 8.4	
LOGGED BY: DON HANSON	
SAMPLING METHODS: 2.5" SPLIT SPOONS	WELL COMPLETION: ■ SURFACE HOUSING; ▭ STAND PIPE ____ FT.

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	Hnu	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									7-inches pre-cored concrete
									Silty SAND
									Yellowish brown fine sand, moist, no odors
								SM	4.5': a few interbeded 1-3" thick sandy silt layers
S	1.5	5 5 6	5						5 ft': grades to mottled dark yellowish brown and dark gray, no odors
				Water Level 8.4 feet 4/9/97					
S	1.5	8 7 6	10						**Poorly graded SAND**
									Very dark gray fine sand with a trace of silt and wood debris, wet, loose, no odors
S	1.0	6 6 5							
			15						15.5': grades to mostly medium sand
S	1.0	5 5 4						SP	17': sand begins flowing up the lead auger, making sampling difficult
			20						18': grades to fi-med sand, trace of wood chips, wet, no odors, sand flowing up augers
			25						

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: NORTH FIRE AISLE	
DRILLING COMPANY: CASCADE	DRILLER: JAMES
DRILLING METHOD: HSA	DRILL BIT(S) SIZE: 9-INCH OD
ISOLATION CASING	FROM TO FT.
BLANK CASING: 2" SCHEDULE 40 PVC PIPE	FROM 0.0 TO 10.0 FT.
PERFORATED CASING: 2" SCHEDULE 40 PVC PIPE (0.010 SLOT)	FROM 10.0 TO 20.0 FT.
SIZE AND TYPE OF FILTER PACK: LAPIS LUSTRE #2/12 MONTEREY SAND	FROM 8.0 TO 20.0 FT.
SEAL: PURE GOLD BENTONITE CHIPS	FROM 1.0 TO 8.0 FT.
GROUT: CONCRETE (FOR SETTING MONUMENT)	FROM 0.0 TO 1.0 FT.

Boring/Well Name MW-33A

Project Name PACCAR DATA GAPS

Project Number 016110.00

ELEVATION AND DATUM	TOTAL DEPTH: 20.0
DATE STARTED: 03/14/2002	DATE COMPLETED: 03/14/2002
INITIAL WATER DEPTH (FT): 9.0	
LOGGED BY: DKM	
SAMPLING METHODS: SPLIT SPOON	WELL COMPLETION: ■ SURFACE HOUSING; ▭ STAND PIPE ____ FT.

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SP	**Concrete** Concrete slab and 2 inches pea gravel. **Poorly graded SAND** Brown poorly graded fine sand, no odor.
S	1.5	3 4 5	5			6.7		ML	**SILT with sand** Orange/brown silt with 5-10% fine sand in bands and pods, no odor.
S	1.5	5 7 9				8.6			
S	1.5	5 4 3	10			9.0		SM	**Silty SAND** Gray to brown silty fine sand, 40% silt, no odor, wet, 50/50 fine and and silt below 13 feet.
S	1.5	10 10 7				10.8			
S	1.5	1 4 5	15			8.1		SP	**Poorly graded SAND** Gray poorly graded medium sand, up to 5% silt, no odor.
S	1.5	50	20						
			25						
			30						

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: NORTH FIRE AISLE	**Boring/Well Name** MW-34A
DRILLING COMPANY: CASCADE	DRILLER: JAMES — **Project Name** PACCAR DATA GAPS
DRILLING METHOD: HSA	DRILL BIT(S) SIZE: 9-INCH OD — **Project Number** 016110.00
ISOLATION CASING	FROM — TO — FT.
BLANK CASING: 2" SCHEDULE 40 PVC PIPE	FROM 0.0 TO 10.0 FT.
PERFORATED CASING: 2" SCHEDULE 40 PVC PIPE (0.010 SLOT)	FROM 10.0 TO 20.0 FT.
SIZE AND TYPE OF FILTER PACK: LAPIS LUSTRE #2/12 MONTEREY SAND	FROM 8.0 TO 20.0 FT.
SEAL: PURE GOLD BENTONITE CHIPS	FROM 1.0 TO 8.0 FT.
GROUT: CONCRETE (FOR SETTING MONUMENT)	FROM 0.0 TO 1.0 FT.

ELEVATION AND DATUM	TOTAL DEPTH: 21.5
DATE STARTED: 03/14/2002	DATE COMPLETED: 03/14/2002
INITIAL WATER DEPTH (FT): 9.0	
LOGGED BY: DKM	
SAMPLING METHODS: SPLIT SPOON	WELL COMPLETION: ■ SURFACE HOUSING; ☐ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	OVA	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
							Concrete — Concrete slab and 2 inches pea gravel.
						SP	**Poorly graded SAND** — Brown poorly graded fine sand with some silt, no odor.
S	1.5	2 2 4	5		8.2	ML	**SILT with sand** — Tan/gray mottled orange silt with 5–10% fine sand, moderately dense, no odor.
S	1.5	4 4 6			8.3		**Silty SAND** — Gray to brown silty fine sand, 35–40% silt, no odor, 20–25% silt below 11 feet.
S	1.5	4 4 4	10		9.3	SM	
S	1.5	10 12 14			8.0		
S	1.5	4 4 5	15				
S	1.5	19 33 23				SP	**Poorly graded SAND** — Gray poorly graded medium sand, up to 5% silt, no odor.
S	0.5	6 8 8	20				
			25				
			30				

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: INSIDE PLASTICS SHOP	**Boring/Well Name** MW-35A
DRILLING COMPANY: CASCADE — DRILLER: JAMES	**Project Name** PACCAR DATA GAPS
DRILLING METHOD: HSA LIMITED ACCESS RIG — DRILL BIT(S) SIZE: 9-INCH OD	**Project Number** 016110.00
ISOLATION CASING: FROM TO FT.	ELEVATION AND DATUM: — TOTAL DEPTH: 20.0
BLANK CASING: 2" SCHEDULE 40 PVC PIPE — FROM 0.0 TO 10.0 FT.	DATE STARTED: 03/13/2002 — DATE COMPLETED: 03/13/2002
PERFORATED CASING: 2" SCHEDULE 40 PVC PIPE (0.010 SLOT) — FROM 10.0 TO 20.0 FT.	INITIAL WATER DEPTH (FT): 8.5
SIZE AND TYPE OF FILTER PACK: LAPIS LUSTRE #2/12 MONTEREY SAND — FROM 8.0 TO 20.0 FT.	LOGGED BY: DKM
SEAL: PURE GOLD BENTONITE CHIPS — FROM 1.0 TO 8.0 FT.	SAMPLING METHODS: SPLIT SPOON — WELL COMPLETION: ■ SURFACE HOUSING, □ STAND PIPE ____ FT.
GROUT: CONCRETE (FOR SETTING MONUMENT) — FROM 0.0 TO 1.0 FT.	

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									Concrete
			5					SM	**Silty SAND** Brown fine sand with 30-50% silt, local "layered" texture variation, no odor.
S	1.5	4 4 7	10			8.0		SM	**Silty SAND** Gray/brown fine sand with 30% silt, "layered" texture, coarsens downward slightly, no odor.
S	1.5	11 16 14	15			7.7		SP	**Poorly graded SAND** Gray poorly graded medium sand, up to 5% silt in thin bands in upper 5 feet, no odor.
S	1.5	16 30 25	20						
			25						
			30						

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	INSIDE PLASTICS SHOP		
DRILLING COMPANY	CASCADE	DRILLER	JAMES
DRILLING METHOD	HSA LIMITED ACCESS RIG	DRILL BIT(S) SIZE:	9-INCH OD

		FROM	TO	FT.
ISOLATION CASING				
BLANK CASING	2" SCHEDULE 40 PVC PIPE	0.0	35.0	FT.
PERFORATED CASING	2" SCHEDULE 40 PVC PIPE (0.010 SLOT)	35.0	40.0	FT.
SIZE AND TYPE OF FILTER PACK	LAPIS LUSTRE #2/12 MONTEREY SAND	33.0	40.0	FT.
SEAL	PURE GOLD BENTONITE CHIPS	1.0	33.0	FT.
GROUT	CONCRETE (FOR SETTING MONUMENT)	0.0	1.0	FT.

Boring/Well Name MW-35B

Project Name PACCAR DATA GAPS

Project Number 016110.00

ELEVATION AND DATUM	TOTAL DEPTH 40.5
DATE STARTED 03/13/2002	DATE COMPLETED 03/13/2002
INITIAL WATER DEPTH (FT) 10.0	
LOGGED BY DKM	
SAMPLING METHODS SPLIT SPOON	WELL COMPLETION ■ SURFACE HOUSING ☐ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									Concrete
S	1.5	16 12 12				3.8		SM	**Silty SAND** Brown fine sand with 30-50% silt, local "layered" texture variation, no odor.
S	1.5	4 6 7	5			1.9			
S	1.5	4 8 9				1.5		SM	**Silty SAND** Gray/brown fine sand with 30% silt, "layered" texture, coarsens downward slightly, no odor.
S	1.5	8 11 11	10						
S	1.5	8 12 14						SP	**Poorly graded SAND** Gray poorly graded medium sand, up to 5% silt in thin bands in upper 5 feet, no odor. Driller reports heaving sands 15-35 feet.
S	1.5	10 12 14	15			2.4			
S	0	3 27 50							
S	0	14 15 26	20						
S	1.5	9 27 30				3.9			
S	0	6 7 14	25						
S	1.5	27 50							
			30						

Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name PACCAR DATA GAPS **Project Number** 016110.00 **Boring/Well Name** MW-35B

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
S	0	24 50							
S	0.3	5 5 5	35					SP	
S	1.5	27 50				7.2			
S	1.0	7 15 50	40					ML	**Sandy SILT** Gray sandy silt to silty sand, textural layering, no odor. Upper contact grades over 2 inches, but distinct.
			45						
			50						
			55						
			60						
			65						
			70						

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: SOUTH OF PLASTICS SHOP	**Boring/Well Name** MW-36A
DRILLING COMPANY: CASCADE	DRILLER: YANCCY
DRILLING METHOD: HSA	DRILL BIT(S) SIZE: 9-INCH OD
Project Name PACCAR DATA GAPS	
Project Number 016110.00	

	FROM	TO	FT.
ISOLATION CASING			
BLANK CASING: 2" SCHEDULE 40 PVC PIPE	0.0	10.0	FT.
PERFORATED CASING: 2" SCHEDULE 40 PVC PIPE (0.010 SLOT)	10.0	20.0	FT.
SIZE AND TYPE OF FILTER PACK: LAPIS LUSTRE #2/12 MONTEREY SAND	8.0	20.0	FT.
SEAL: PURE GOLD BENTONITE CHIPS	1.0	8.0	FT.
GROUT: CONCRETE (FOR SETTING MONUMENT)	0.0	1.0	FT.

ELEVATION AND DATUM	TOTAL DEPTH: 21.5
DATE STARTED: 03/11/2002	DATE COMPLETED: 03/11/2002
INITIAL WATER DEPTH (FT): 8.5	
LOGGED BY: DKM	
SAMPLING METHODS: SPLIT SPOON	WELL COMPLETION: ■ SURFACE HOUSING; □ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									Concrete
								SM	Concrete with crushed rock base
									Silty SAND
									Light brown silty fine sand, no odor.
S	1.5	4 3 3	5			10.7		SM	**Silty SAND**
									Brown/gray moderately dense sandy silt grading to silty sand, no odor. Silt with some fine sand 2–4 feet; 50/50 mixture of fine sand and silt 4–7 feet; 60% fine sand, 30% silt, 10% medium sand 7–8 feet.
S	1.5	7 11 7	10			12.7			**Poorly graded SAND**
								SP	Brown to gray medium sand, 5–10% silt in small clumps in upper 1 foot, up to 5% silt to 13 feet, minor to no silt below 14 feet. No odor.
S	1.5	12 23 20	15						
S	1.5	6 8 11	20						
			25						
			30						

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: SOUTH OF PLASTICS SHOP	**Boring/Well Name** MW-36B
DRILLING COMPANY: CASCADE; DRILLER: YANCCY	**Project Name** PACCAR DATA GAPS
DRILLING METHOD: HSA; DRILL BIT(S) SIZE: 9-INCH OD	**Project Number** 016110.00
ISOLATION CASING: FROM TO FT.	ELEVATION AND DATUM; TOTAL DEPTH: 43.5
BLANK CASING: 2" SCHEDULE 40 PVC PIPE — FROM 0.0 TO 37.0 FT.	DATE STARTED: 03/11/2002; DATE COMPLETED: 03/11/2002
PERFORATED CASING: 2" SCHEDULE 40 PVC PIPE (0.010 SLOT) — FROM 37.0 TO 42.0 FT.	INITIAL WATER DEPTH (FT): 8.5
SIZE AND TYPE OF FILTER PACK: LAPIS LUSTRE #2/12 MONTEREY SAND — FROM 35.0 TO 42.0 FT.	LOGGED BY: DKM
SEAL: PURE GOLD BENTONITE CHIPS — FROM 1.0 TO 35.0 FT.	SAMPLING METHODS: SPLIT SPOON; WELL COMPLETION: SURFACE HOUSING / STAND PIPE ____ FT.
GROUT: CONCRETE (FOR SETTING MONUMENT) — FROM 0.0 TO 1.0 FT.	

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									Concrete
								SM	Concrete with crushed rock base.
S	1	34, 7, 8				6.8			**Silty SAND**
S	1.5	3, 3, 5							Light brown silty fine sand, no odor.
S	1.5	5, 5, 5	5			6.3		SM	**Silty SAND**
S	1.5	3, 3, 3							Brown/gray moderately dense sandy silt grading to silty sand, no odor. Silt with some fine sand 2–4 feet; 50/50 mixture of fine sand and silt 4–7 feet; 60% fine sand, 30% silt, 10% medium sand 7–8 feet.
S	1.5	8, 9, 11							
S	0.5	9, 11, 8	10			8.1			**Poorly graded SAND**
S	1.5	6, 8, 10							Brown to gray medium sand, 5–10% silt in small clumps in upper 1 foot, up to 5% silt to 13 feet, minor to no silt below 13 feet, some coarse sand 30–35 feet. No odor.
S	1.5	7, 8, 10							
S	1.5	7, 8, 15							
S	1.5	9, 17, 23	15			7.5			
S	1.5	9, 17, 22							
S	1.5	9, 7, 13						SP	
S	1.5	7, 22, 33	20						
S	1.5	7, 9, 10				10.6			
S	1.5	3, 7, 14							
S	1.5	3, 7, 14	25						
S	1.5	6, 6, 11							
S	1.5	50							
S	1.5	3, 7, 19	30						

Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name PACCAR DATA GAPS **Project Number** 016110.00 **Boring/Well Name** MW-36B

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
S	1.5	3 7 12						SP	
S	1.5	15 23 25							
S	1.5	10 20 50							
S	1.0	50	35						
S	1.5	50							
S	1.5	10 13 10						ML	**SILT** Gray dense silt, no odor.
S	1.5	10 11 13	40					SP	**Poorly graded SAND** Gray poorly graded medium sand, some silt 40–41 feet.
S	1.5	12 23 50				9.6		ML	**Sandy SILT** Silt and fine sand mixture, approximately 50/50, moderately dense, no odor.
S	1.5	9 11 16	45						
			50						
			55						
			60						
			65						
			70						

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	SOUTHWEST BULKHEAD CORNER		
DRILLING COMPANY	CASCADE	DRILLER	YANCCY
DRILLING METHOD	HSA	DRILL BIT(S) SIZE:	9-INCH OD

		FROM	TO	FT.
ISOLATION CASING				
BLANK CASING	2" SCHEDULE 40 PVC PIPE	0.0	10.0	
PERFORATED CASING	2" SCHEDULE 40 PVC PIPE (0.010 SLOT)	10.0	20.0	
SIZE AND TYPE OF FILTER PACK	LAPIS LUSTRE #2/12 MONTEREY SAND	8.0	20.0	
SEAL	PURE GOLD BENTONITE CHIPS	1.0	8.0	
GROUT	CONCRETE (FOR SETTING MONUMENT)	0.0	1.0	

Boring/Well Name MW-37A

Project Name PACCAR DATA GAPS

Project Number 016110.00

ELEVATION AND DATUM	TOTAL DEPTH 21.5
DATE STARTED 03/11/2002	DATE COMPLETED 03/11/2002
INITIAL WATER DEPTH (FT) 9.0	
LOGGED BY DKM	
SAMPLING METHODS SPLIT SPOON	WELL COMPLETION ■ SURFACE HOUSING ▭ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									Concrete
								SP	Concrete with crushed rock base.
S	1.5	21 17 15				6.9			**Poorly graded SAND**
			5						Brown poorly graded medium sand with some fine sand and silt, no odor.
S	1.5	12 11 10							**Silty SAND**
								SM	Brown/gray medium sand with 10-20% silt and some fine sand and fine gravel, up to 40% silt 4-6 feet, layered silt/fine sand/medium sand 10-11 feet, angular rock/brick debris 3.5-4 feet, no odor.
S	1.5	10 10 10				2.7			
			10			8.3			
S	1.5	70							
									Poorly graded SAND
S	1.5	18 21 25							Gray poorly graded medium sand, some silt in small clumps above 20 feet. No odor.
			15					SP	
S	1.5	26 50							
S	1.5	26 50							
			20						
S	1.5	25 50							
			25						
			30						

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: SOUTHWEST BULKHEAD CORNER	**Boring/Well Name** MW-37B
DRILLING COMPANY: CASCADE; DRILLER: YANCCY	**Project Name** PACCAR DATA GAPS
DRILLING METHOD: HSA; DRILL BIT(S) SIZE: 9-INCH OD	**Project Number** 016110.00

	FROM	TO	FT.
ISOLATION CASING			
BLANK CASING: 2" SCHEDULE 40 PVC PIPE	0.0	35.0	FT.
PERFORATED CASING: 2" SCHEDULE 40 PVC PIPE (0.010 SLOT)	35.0	40.0	FT.
SIZE AND TYPE OF FILTER PACK: LAPIS LUSTRE #2/12 MONTEREY SAND	33.0	40.0	FT.
SEAL: PURE GOLD BENTONITE CHIPS	1.0	33.0	FT.
GROUT: CONCRETE (FOR SETTING MONUMENT)	0.0	1.0	FT.

ELEVATION AND DATUM	TOTAL DEPTH: 40.5
DATE STARTED: 03/12/2002	DATE COMPLETED: 03/12/2002
INITIAL WATER DEPTH (FT): 9.0	
LOGGED BY: DKM	
SAMPLING METHODS: SPLIT SPOON	WELL COMPLETION: ■ SURFACE HOUSING; ☐ STAND PIPE ____ FT.

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									Concrete Concrete with crushed rock base.
								SP	**Poorly graded SAND** Brown poorly graded medium sand with some fine sand and silt, no odor.
S	1.5	6 6 7	5			4.4			**Silty SAND** Brown/gray medium sand with 10–20% silt and some fine sand and fine gravel, up to 40% silt 4–6 feet, layered silt/fine sand/medium sand 10–11 feet, angular rock/brick debris 3.5–4 feet, no odor.
S	1.5	3 4 4	10			5.8		SM	
S	1.5	7 13 15	15			9.3			**Poorly graded SAND** Gray poorly graded medium sand, some silt in small clumps above 20 feet. No odor.
S	1.5	9 11 14	20					SP	
S	1.5	6 12 19	25						
S	1.5	10 24 28	30						

Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name PACCAR DATA GAPS **Project Number** 016110.00 **Boring/Well Name** MW-37B

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
S	1.5	3 24 35							
S	0.5	15 6 7							
S	1.5	3 8 15	35					SP	
S	1.0	18 60							
S	1.5	8 6 7							
S	1.5	5 5 11	40					ML	**SILT with sand** Dark gray silt with fine sand, moderately dense, no odor.
			45						
			50						
			55						
			60						
			65						
			70						

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	10 FEET EAST OF PILOT WELLS		
DRILLING COMPANY	CASCADE	DRILLER	
DRILLING METHOD	HOLLOW STEM AUGER	DRILL BIT(S) SIZE:	9 INCH OD

Boring/Well Name MW-38A
Project Name PACCAR VES PILOT
Project Number 016110.00

	FROM	TO	FT.
ISOLATION CASING			
BLANK CASING: 2-INCH SCHEDULE 40 PVC PIPE	0.0	13.0	FT.
PERFORATED CASING: 2-INCH SCHEDULE 40 PVC PIPE 0.010 SLOT	13.0	23.0	FT.
SIZE AND TYPE OF FILTER PACK: LAPIS LUSTRE #2/12 MONTEREY SAND	11.0	25.0	FT.
SEAL: PURE GOLD BENTONITE CHIPS	25.0 1.0	38.0 11.0	FT.
GROUT: CONCRETE	0.0	1.0	FT.

ELEVATION AND DATUM	TOTAL DEPTH: 38.0
DATE STARTED: 05/02/2002	DATE COMPLETED: 05/02/2002
INITIAL WATER DEPTH (FT): 8.0	
LOGGED BY: DKM	
SAMPLING METHODS: SPLIT SPOON	WELL COMPLETION: ■ SURFACE HOUSING; □ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	OVA	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
							Concrete
						SW	**Well-graded SAND with gravel**
						SM	Brown sand with 25–30% gravel and some silt, likely fill material.
S	1.5	3 4 5	5	MW-38A-5-5.5	0	ML	**Silty SAND with gravel**
S	1.5	5 5 7		MW-38A-6.5-7	0		Gray silty sand with 5–15% fine to medium gravel.
S	1.5	3 2 2		MW-38A-7	0	SM	**Sandy SILT**
S	1.5	4 6 7					Light brown/orange to gray mottled fine sandy silt.
S	1.5	3 3 2	10		0.1	ML	**Silty SAND**
S	1.5	3 5 4					Light brown silty fine sand
S	1.5	5 5 5				SP	**SILT with sand**
S	1.5	6 5 4					Brown to gray, vaguely layered, silt and fine sand.
S	1.5	8 6 9	15				**Poorly graded SAND**
							Gray to brown poorly graded fine to medium sand with 5–10% silt, silt content decreases with depth.
S	1.5	5 7 10			0.3		
							Poorly graded SAND
S	1.5	5 6 9	20	MW-38A-20 MW-38A-20.5-21	0.6	SP	Gray poorly graded medium sand, 10–20% coarse sand 25–30 feet bgs, 15–20% fine sand below 30 feet bgs.
S	1.5	7 8 12					
S	1.5	14 12 16	25				
S	1.5	9 5 8			0.3		
			30				

Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name PACCAR VES PILOT **Project Number** 016110.00 **Boring/Well Name** MW-38A

SAMPLES TYPE	SAMPLES RECOVERY (FEET)	SAMPLES PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
S	1.5	8 11 10						SP	
S	1.5	5 6 5							**Sandy SILT**
S	1.5	4 4 8	35					ML	Gray to brown silt and fine sand, locally interbedded between sandy silt and fine sand with silt.
S	1.5	4 4 6							

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION	15 FEET WEST OF PILOT WELLS
DRILLING COMPANY	CASCADE
DRILLER	
DRILLING METHOD	HOLLOW STEM AUGER
DRILL BIT(S) SIZE	9 INCH OD
ISOLATION CASING	FROM TO FT.
BLANK CASING	2-INCH SCHEDULE 40 PVC PIPE — FROM 0.0 TO 13.0 FT.
PERFORATED CASING	2-INCH SCHEDULE 40 PVC, PIPE 0.010 SLOT — FROM 13.0 TO 23.0 FT.
SIZE AND TYPE OF FILTER PACK	LAPIS LUSTRE #2/12 MONTEREY SAND — FROM 11.0 TO 23.5 FT.
SEAL	PURE GOLD BENTONITE CHIPS — FROM 1.0 TO 11.0 FT.
GROUT	CONCRETE — FROM 0.0 TO 1.0 FT.

Boring/Well Name	MW-39A
Project Name	PACCAR VES PILOT
Project Number	016110.00
ELEVATION AND DATUM	TOTAL DEPTH 23.5
DATE STARTED 05/02/2002	DATE COMPLETED 05/02/2002
INITIAL WATER DEPTH (FT)	8.0
LOGGED BY	DKM
SAMPLING METHODS	SPLIT SPOON
WELL COMPLETION	■ SURFACE HOUSING; ☐ STAND PIPE ____ FT.

SAMPLES TYPE	RECOVERY (FEET)	PENETRATION RESIST (BLOWS/6 IN.)	DEPTH (FEET)	SAMPLE NO.	WELL CONSTRUCTION	OVA	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SW/SM	Concrete **Well-graded SAND with silt and gravel** Brown to gray mixture of gravel, sand, and silt with minor metal debris, likely fill material.
S	1.5	3 3 4	5			0.9		SM	**Silty SAND** Light brown to gray silty fine sand, some vague layering, 10–30% silt, silt content increases with depth.
S	1.5	2 2 3	10			0		SP	**Poorly graded SAND** Gray poorly graded medium sand, wet, minor silt.
S	1.5	3 4 7	15			0.2			
S	1.5	5 7 7	20			0.2			

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: North of SVE line			Well Name: MW-40A
DRILLING COMPANY: Cascade Drilling, Inc.	DRILLER: Andy		Project Name: PACCAR AS/SVE
DRILLING METHOD(S): HSA	DRILL BIT(S) SIZE: 9-inch		Project Number: 036025.00
ISOLATION CASING: N/A	FROM: N/A	TO: N/A FT.	ELEVATION AND DATUM / TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: 2-inch Schedule 40 PVC pipe	FROM: 0	TO: 10 FT.	DATE STARTED: 2/13/04 / DATE COMPLETED: 2/13/04
SLOTTED CASING: 2" schedule 40 PVC pipe, 0.010-slot	FROM: 10	TO: 20 FT.	INITIAL WATER DEPTH (FT): 7
SIZE AND TYPE OF FILTER PACK: Lapis Luster #2/12 Monterey Sand (RMC)	FROM: 8	TO: 20 FT.	LOGGED BY: DKM
SEAL: Bentonite Chips (Pure Gold Med)	FROM: 1	TO: 8 FT.	SAMPLING METHODS: Split Spoon / WELL COMPLETION: ■ SURFACE HOUSING, □ STAND PIPE ____ FT.
GROUT: Concrete (monument set)	FROM: 0	TO: 1 FT.	

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
			0					**Poorly graded SAND with silt** Brown, poorly graded fine sand with ~10% silt, some silt clumps, some light brown silty sand in cuttings, no odor.
SS	1.5	7 11 9	5				SP/ SM	
								Silty SAND Gray/brown, poorly graded fine sand/silty sand/sandy silt alternating at ~10-11 feet, overall ~15-20% silt with poorly graded fine sand, minor medium sand, some layering, wet, no odor, no sheen.
SS	1.5	5 6 7	10				SM	
								Poorly graded SAND Dark gray, poorly graded medium sand with some fine sand and minor silt, wet, no odor, no sheen.
SS	1.5	3 4 3	15				SP	
			20					

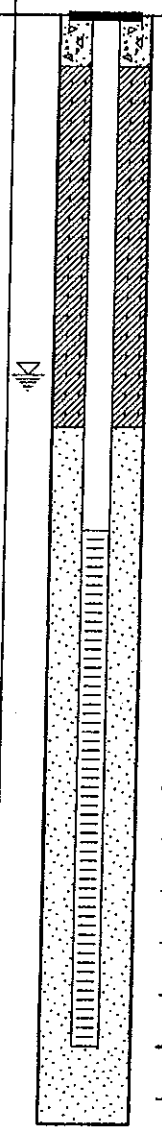
KJ PNW ASW-25-33.GPJ KJ PNW.GDT 9/16/04

F-40.1
(6-87) (3-88) (8-90)

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: South of SVE line		Well Name: MW-41A	
DRILLING COMPANY: Cascade Drilling, Inc.	DRILLER: Andy	Project Name: PACCAR AS/SVE	
DRILLING METHOD(S): HSA	DRILL BIT(S) SIZE: 9-inch	Project Number: 036025.00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM	TOTAL DEPTH: 21.5 ft. bgs
BLANK CASING: 2-inch Schedule 40 PVC pipe	FROM 0 TO 10 FT.	DATE STARTED: 2/13/04	DATE COMPLETED: 2/13/04
SLOTTED CASING: 2" schedule 40 PVC pipe, 0.010-slot	FROM 10 TO 20 FT.	INITIAL WATER DEPTH (FT): 7	
SIZE AND TYPE OF FILTER PACK: Lapis Luster #2/12 Monterey Sand (RMC)	FROM 8 TO 21.5 FT.	LOGGED BY: DKM	
SEAL: Bentonite Chips (Pure Gold Med)	FROM 1 TO 8 FT.	SAMPLING METHODS: Split Spoon	WELL COMPLETION: ■ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: Concrete (monument set)	FROM 0 TO 1 FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
							SP	**Poorly graded SAND** Brown, poorly graded medium sand, some silt, no odor, no sheen.
SS	1.5	5 5 10	5				ML/ CL	**Clayey SILT** Dark gray, clayey silt, some fine sand, appears layered, medium sand above and below, no chemical odor, no sheen.
							SM	**Silty SAND** Brown to dark gray, ~20-25% silt total with fine sand and medium sand, texturally layered, fine sand, silty fine sand and sandy silt, wet, very sloppy, no odor, no sheen.
SS	1.5	6 10 10	10					
							SP	**Poorly graded SAND** Brown/gray, poorly graded medium sand, up to ~5% silt in clumps, silty sand cuttings, wet, no odor, no sheen.
SS	1.5	6 10 12	15					
SS	1.5	10 21 32	20					

KJ PNW_ASW-25-33.GPJ KJ PNW.GDT 9/16/04

F-40.1
(6-87) (3-88) (8-90)

SHEET 1 OF 1

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: Between SFA-5 & SFA-4		**Well Name**	MW-42A
DRILLING COMPANY: Cascade Drilling, Inc.	DRILLER:	**Project Name**	PACCAR
DRILLING METHOD(S): HSA	DRILL BIT(S) SIZE: 9 inches	**Project Number**	046001.00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: 2" Sched. 40 PVC Pipe	FROM 0 TO 5 FT.	DATE STARTED: 4/26/04	DATE COMPLETED: 4/26/04
SLOTTED CASING: 2" Sched. 40 PVC 0.010 Slot	FROM 5 TO 20 FT.	INITIAL WATER DEPTH (FT): N/A	
SIZE AND TYPE OF FILTER PACK: #2/12 Monterey Sand	FROM 3 TO 20 FT.	LOGGED BY: DKM	
SEAL: Bentonite Chips	FROM 1 TO 3 FT.	SAMPLING METHODS: Split spoon	WELL COMPLETION: ☐ SURFACE HOUSING ■ STAND PIPE N/A FT.
GROUT: Concrete	FROM 0 TO 1 FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	OVA/PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
									Approximately 8 inches of concrete.
								SP/ SM	**Poorly graded SAND with silt** Medium brown, poorly graded sand with ~10-15% silt in small clumps, moderately dense, massive, moist, slight odor mainly from ~5-5.5 feet, no sheen.
SS	1.5	10 9 5	5			2.3			
SS	1.5	7 8 8	10			2.1		SP	**Poorly graded SAND** Grey, poorly graded sand, mainly medium sand, minor if any silt, coarsens slightly downwards, moderately dense, wet, no evident odor, no sheen.
SS	1.5	15 15 15	15			1.9			
SS	1.5	8 5 9	20			NA			

KJ PNW PACCAR BORING LOGS SFA.GPJ KJ PNW.GDT 9/10/04

F-40.1
(6-87) (3-88) (8-90)

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	TESTING AND LABORATORY DATA
0		Concrete (6 inches).				
	SM	Described from soil cuttings: Dark brown, silty, fine to coarse SAND; moist. (Fill)				
		Driller missed sampling interval. Began sampling at 5 feet bgs.				
5	SM	Loose, brown, silty, fine to coarse SAND, some organics, iron-oxide staining. (Fill) No odor, no discoloration.	6	0.6		MW-44BSB-5'
	SM	Loose, brown to gray, silty, fine to medium SAND, organics (wood chips); moist to wet. Strong petroleum hydrocarbon odor, gray petroleum discoloration.	6 4	>400 >400	▽	MW-44BSB-7.5'
10	PT SM	Organic-rich layer (approximately 6 inches thick). Very strong odor, 50% sheen. Loose to medium dense, dark brown, silty, fine SAND, abundant organics; wet. Very strong odor. Organic-rich, silty SAND. Very strong odor. Olive-brown SILT lenses (< 0.25 inches thick).	6 12 50/6"	55 115		MW-44BSB-10'
		Drilled through an obstruction.		17		
15		Driller reports void from 15 to 16 feet bgs.				
		End of boring at 16 feet bgs. Backfilled with fine bentonite chips with concrete patch at surface.				
20						
25						
30						

BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
DRILLING DATES: 9/16/2011 - 9/16/2011

REMARKS:
Drilled through unknown pipe.

Redrilled MW-44A (1) to install the well.

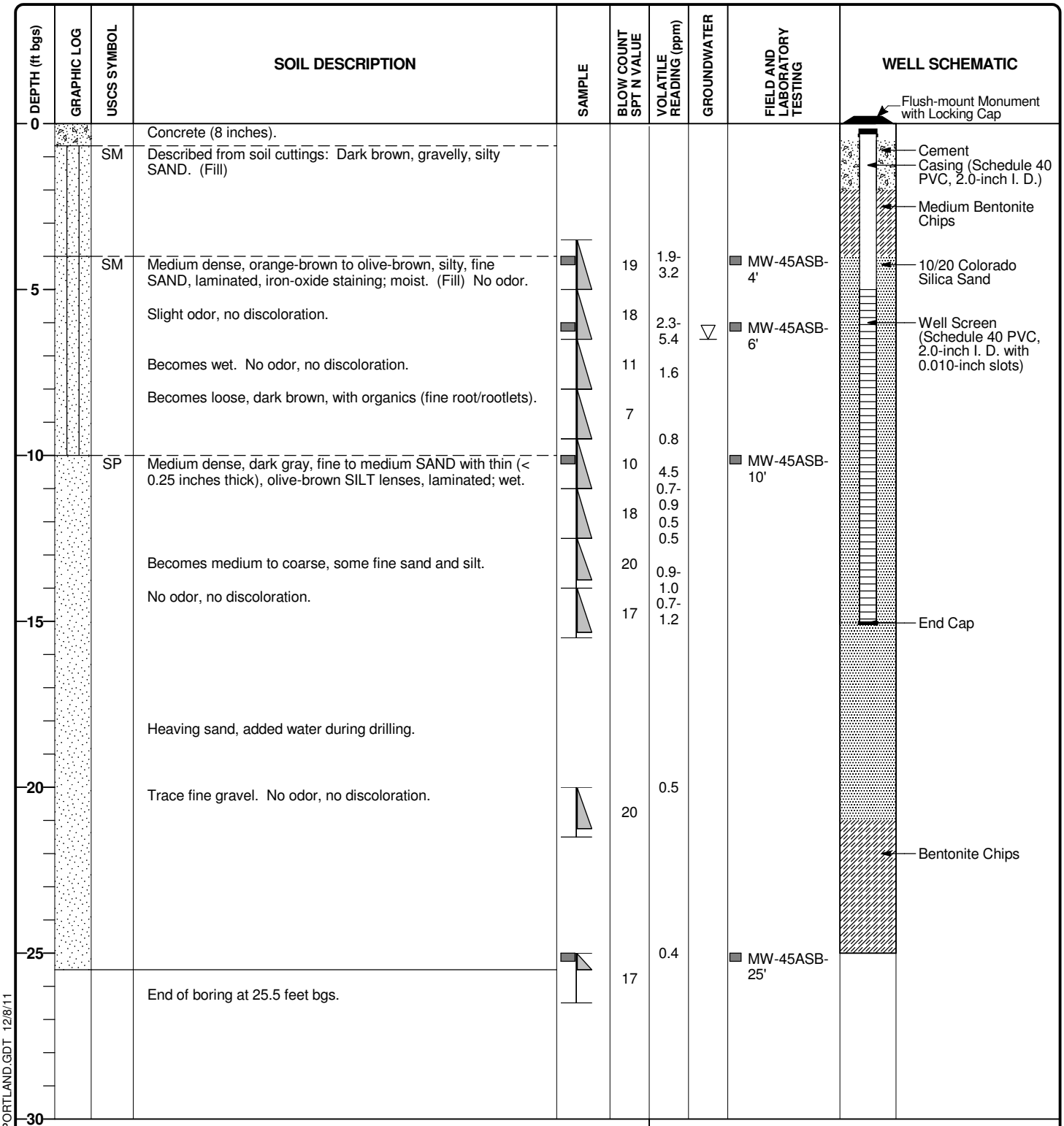
8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-44B

ENVIRONMENTAL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11



BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: /AAF685
DRILLING DATES: 9/21/2011 - 9/21/2011

REMARKS:

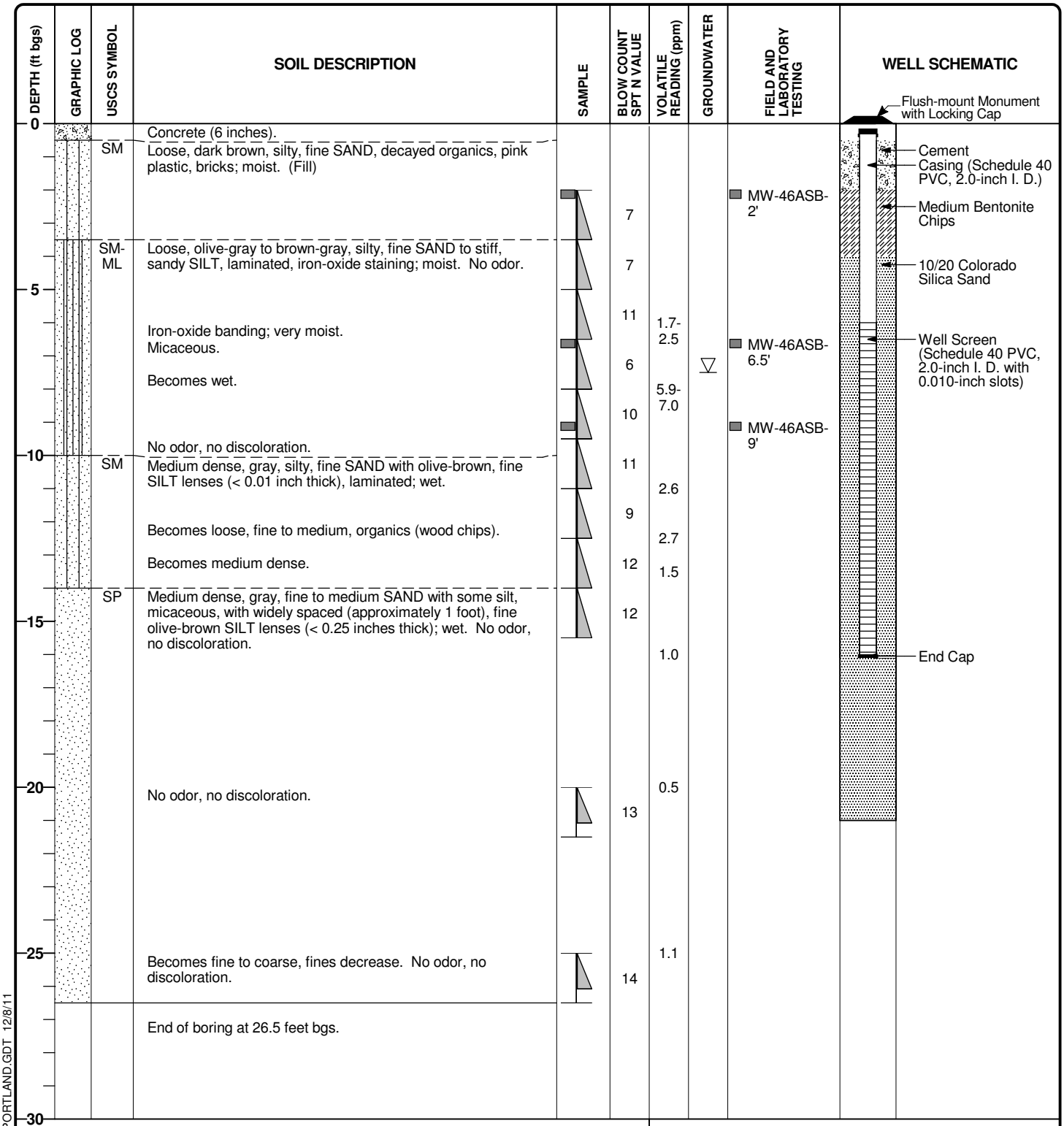
ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-45A



BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: /AAF683
DRILLING DATES: 9/15/2011 - 9/15/2011

REMARKS:

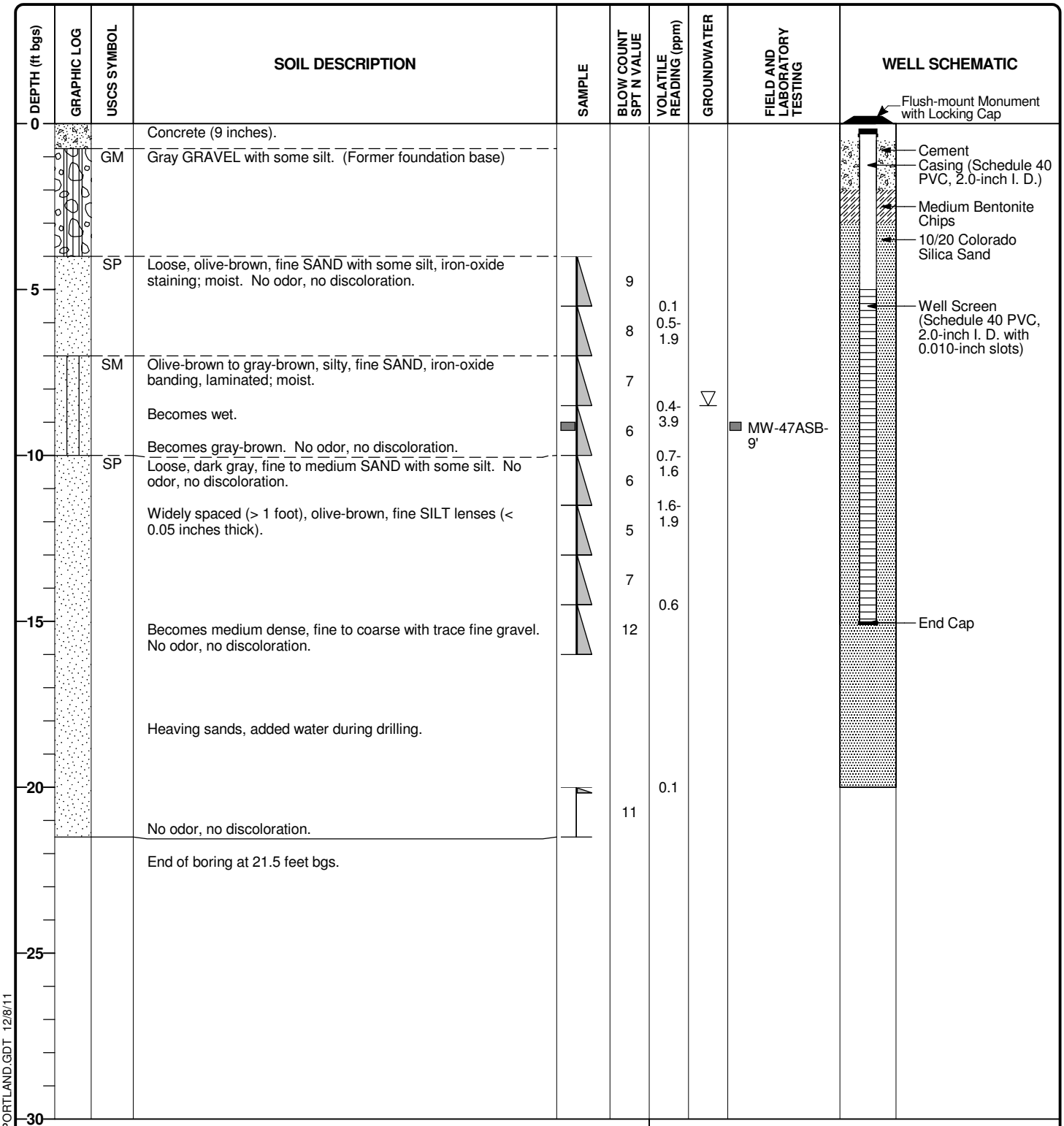
ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-46A



BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: NA
DRILLING DATES: 9/16/2011 - 9/16/2011

REMARKS:

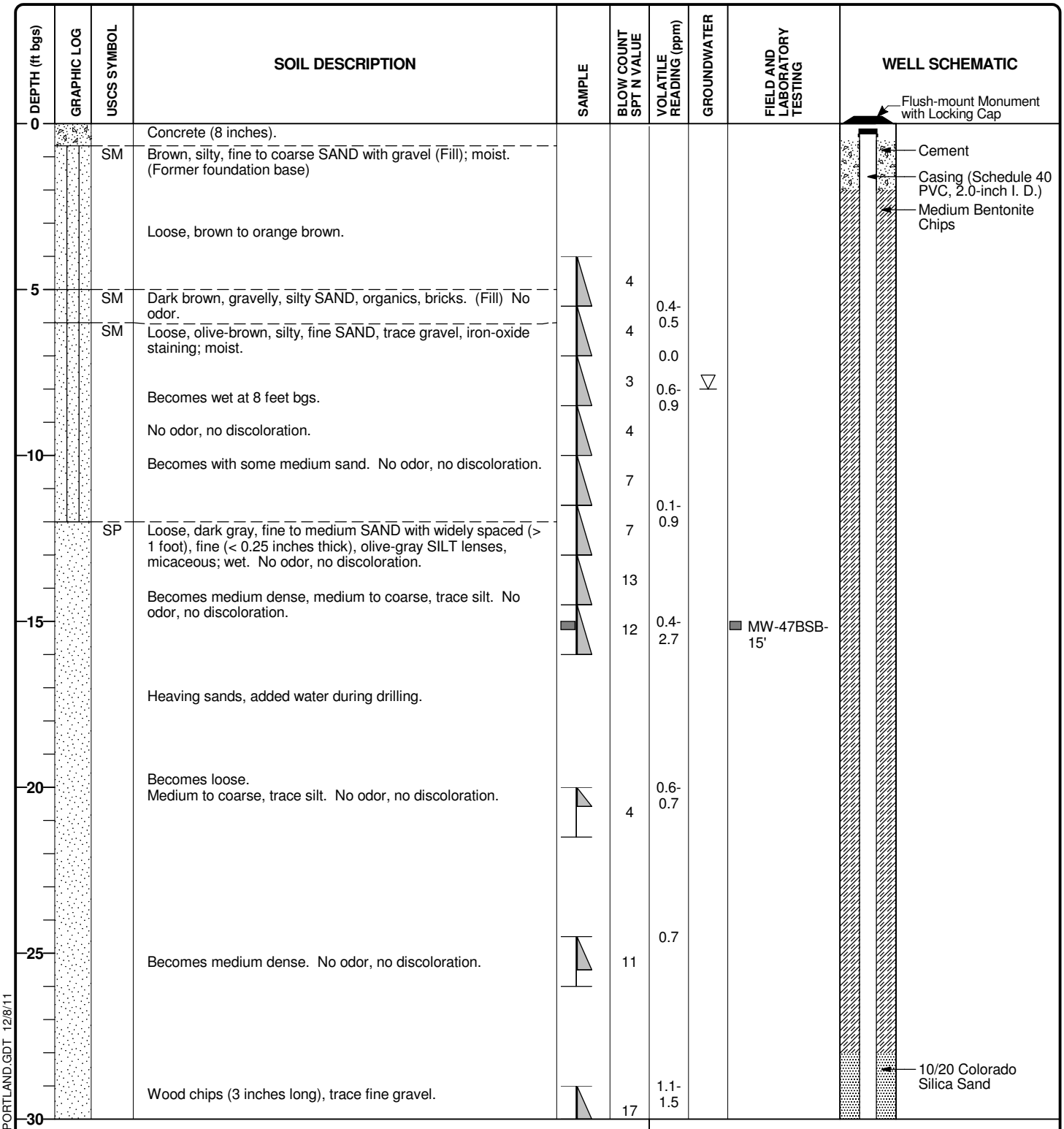
ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-47A



BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: NA
DRILLING DATES: 9/19/2011 - 9/19/2011

REMARKS:

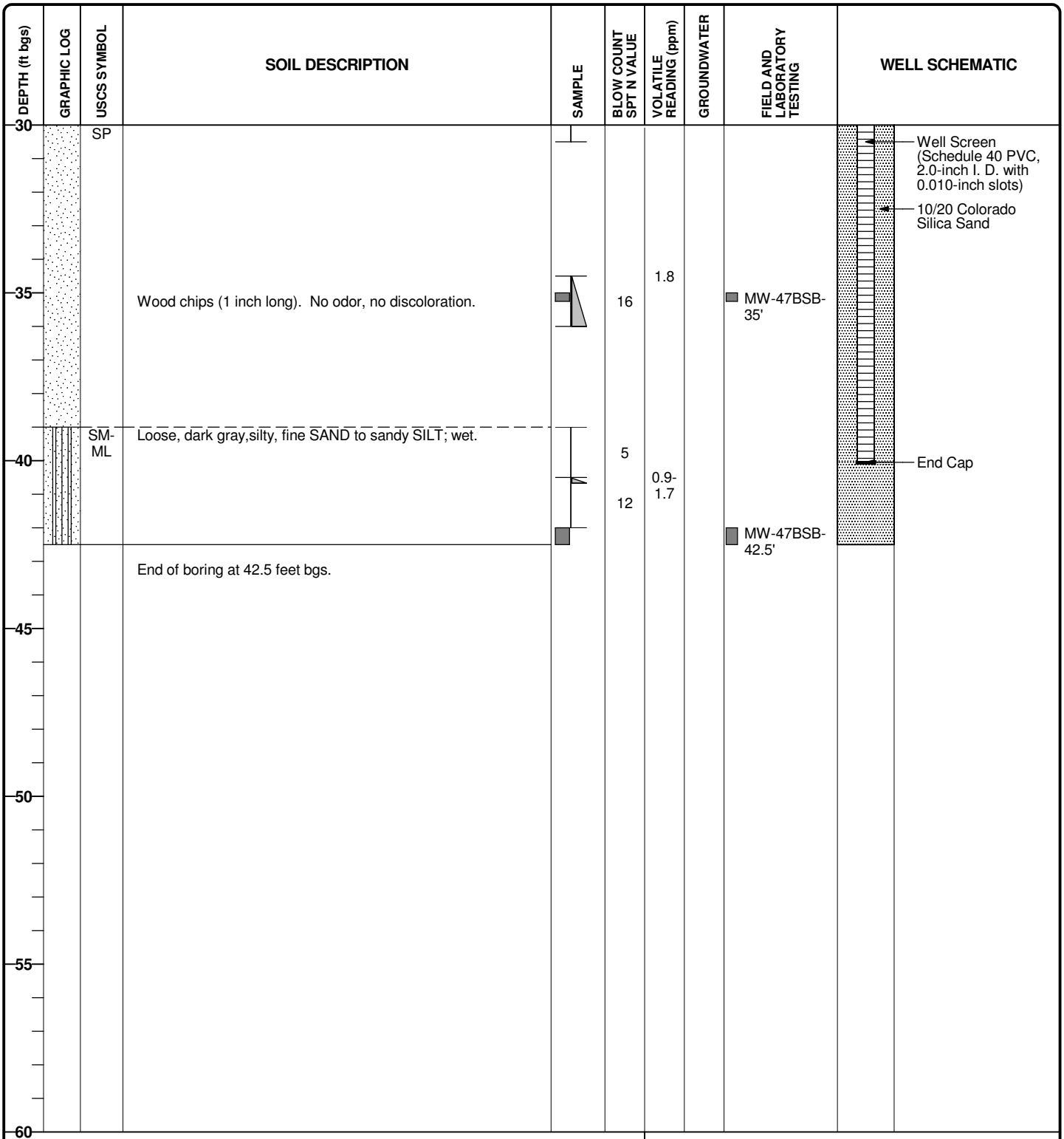
ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-47B



BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: NA
DRILLING DATES: 9/19/2011 - 9/19/2011

REMARKS:

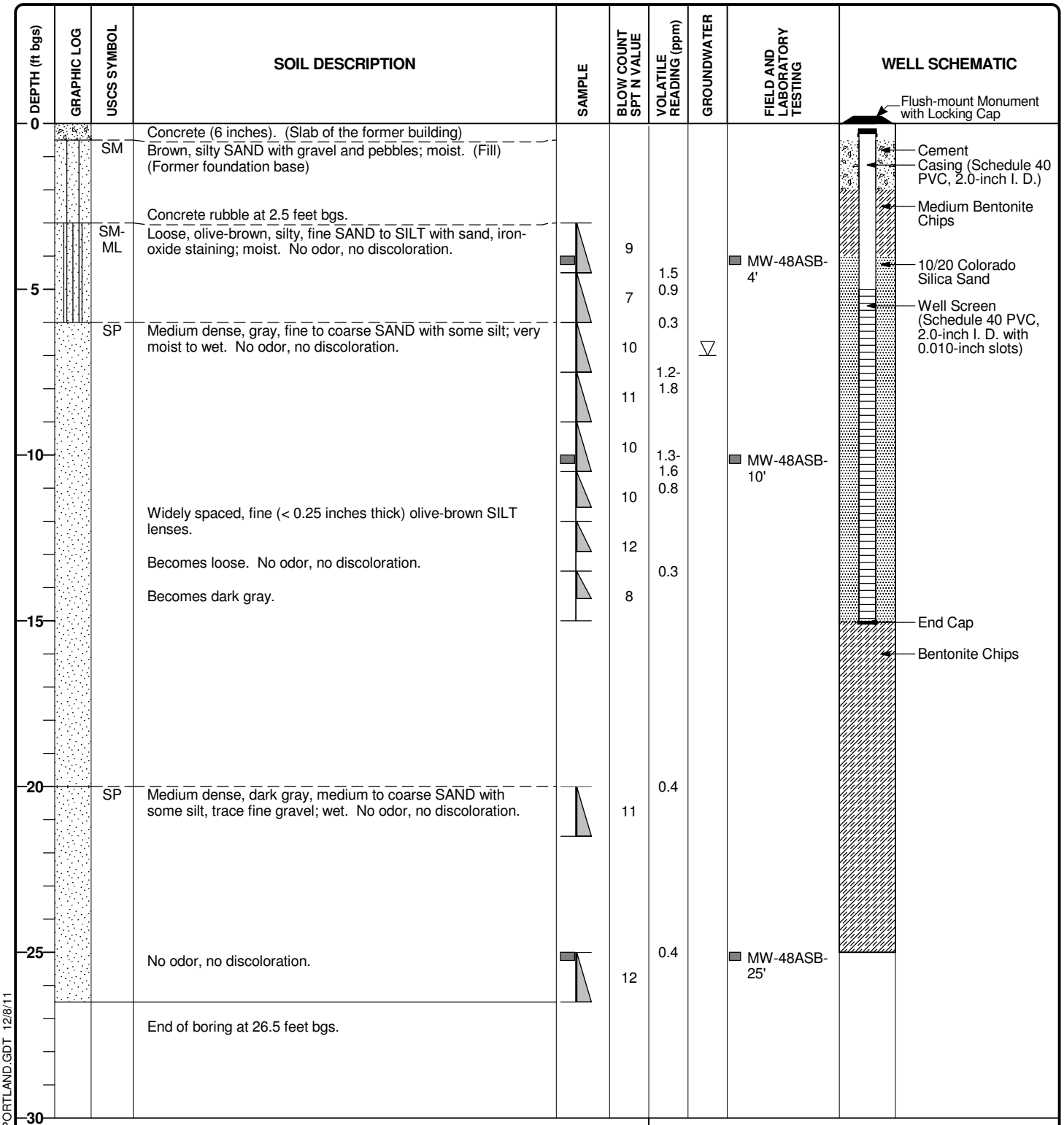
ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-47B



BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: /AAF678
DRILLING DATES: 9/15/2011 - 9/15/2011

REMARKS:

ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

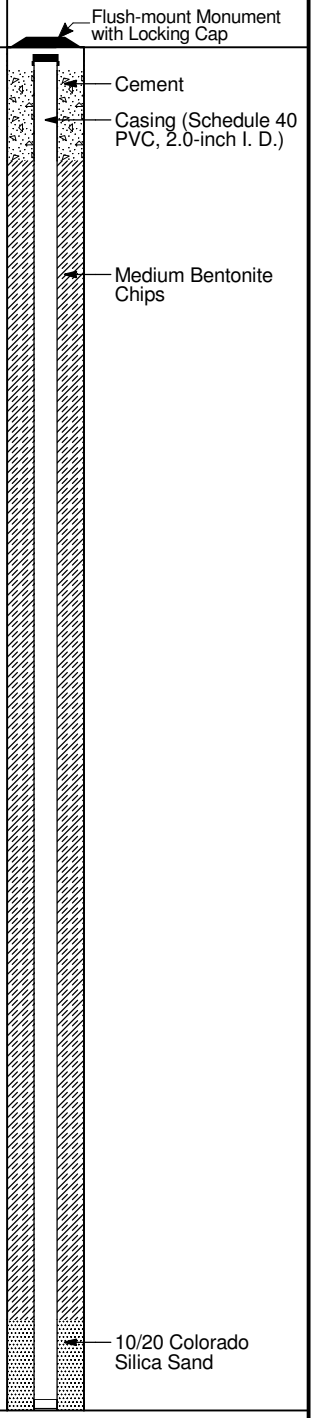
AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-48A

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER
0		Concrete (6 inches).			
	GM	Brown, silty GRAVEL with concrete; dry. (Former foundation base)			
	ML	Medium stiff, olive-gray to olive-brown, sandy SILT, iron-oxide staining; slightly moist. No odor, no discoloration.	5		
5	SM	Loose, brown, silty, fine SAND, trace gravel, laminated with fine (< 0.25 inches thick) SILT lenses, iron-oxide staining; moist.	8	0.6	
		Becomes dark brown to orange-brown, fine to medium; wet.	9	1.8	▽
	SP	Medium dense, dark gray, medium to coarse SAND with some silt; wet.	10		
10		Widely spaced (approximately 1 foot), fine (< 0.25 inches thick), brown SILT lenses. No odor, no discoloration. Fine subrounded brick (< 10 mm), trace subrounded, fine gravel.	11	1.3	
			11	1.6	
		No odor, no discoloration.	14	0.3	
		Heaving sands, added water during drilling.	14		
15					
20		Dark gray, trace silt. No odor, no discoloration.	18	0.3-0.8	
25			12	0.4-0.5	
30					

FIELD AND LABORATORY TESTING

WELL SCHEMATIC



BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: /AAF679
DRILLING DATES: 9/15/2011 - 9/15/2011

REMARKS:

ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-48B

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	FIELD AND LABORATORY TESTING
30	SP	Becomes fine to medium, silt increases. No odor, no discoloration.	13	1.5-2.1	
35	ML-SM	Medium dense, dark gray, silty, fine SAND to stiff, sandy SILT; wet. No odor, no discoloration.	16	1.8	MW-48BSB-35'
40			16	0.8	
		End of boring at 41.5 feet bgs.			
45					
50					
55					
60					

WELL SCHEMATIC: Well Screen (Schedule 40 PVC, 2.0-inch I. D. with 0.010-inch slots); 10/20 Colorado Silica Sand; End Cap

BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: /AAF679
DRILLING DATES: 9/15/2011 - 9/15/2011

REMARKS:

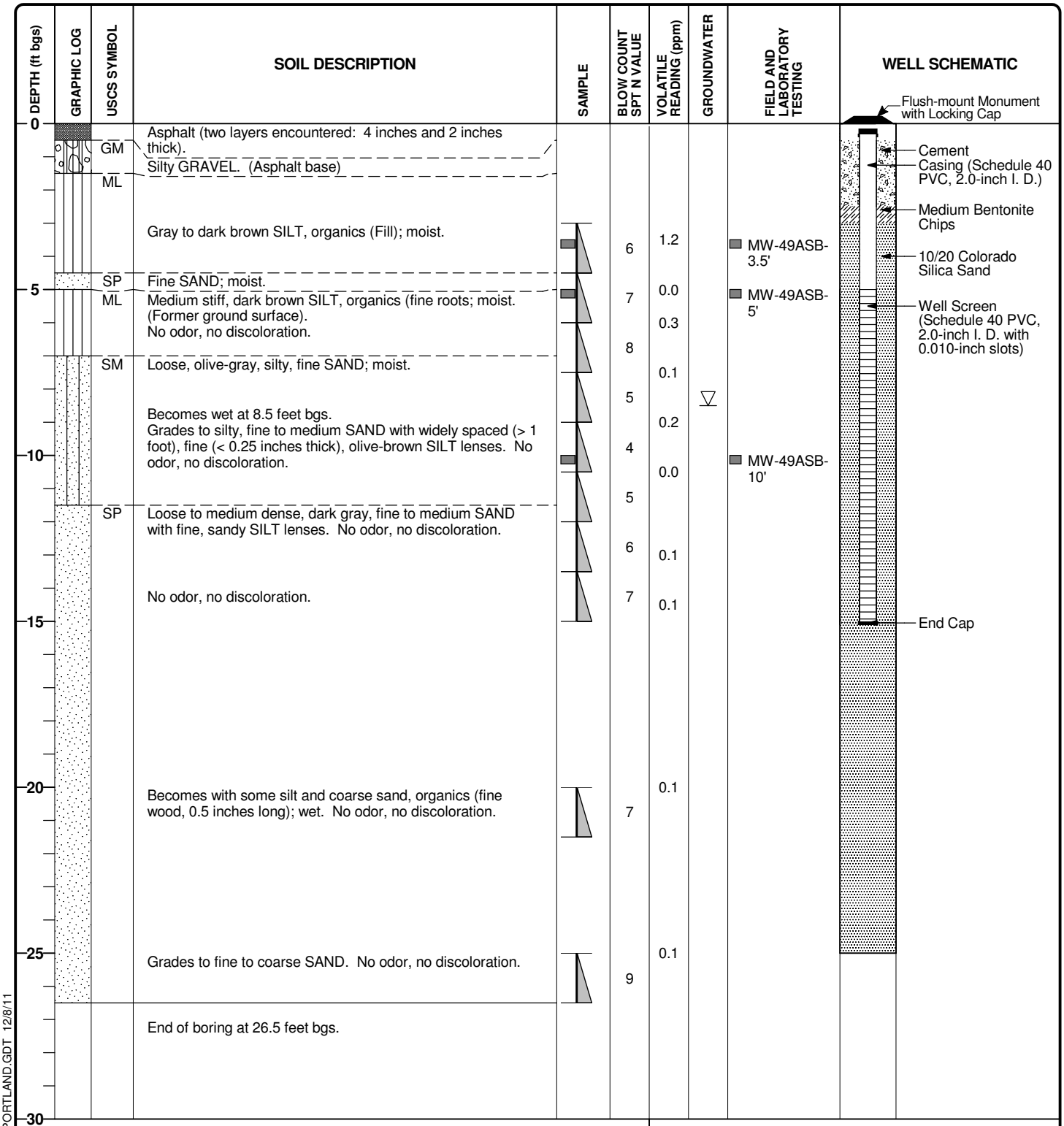
ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-48B



BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: NA
DRILLING DATES: 9/19/2011 - 9/19/2011

REMARKS:

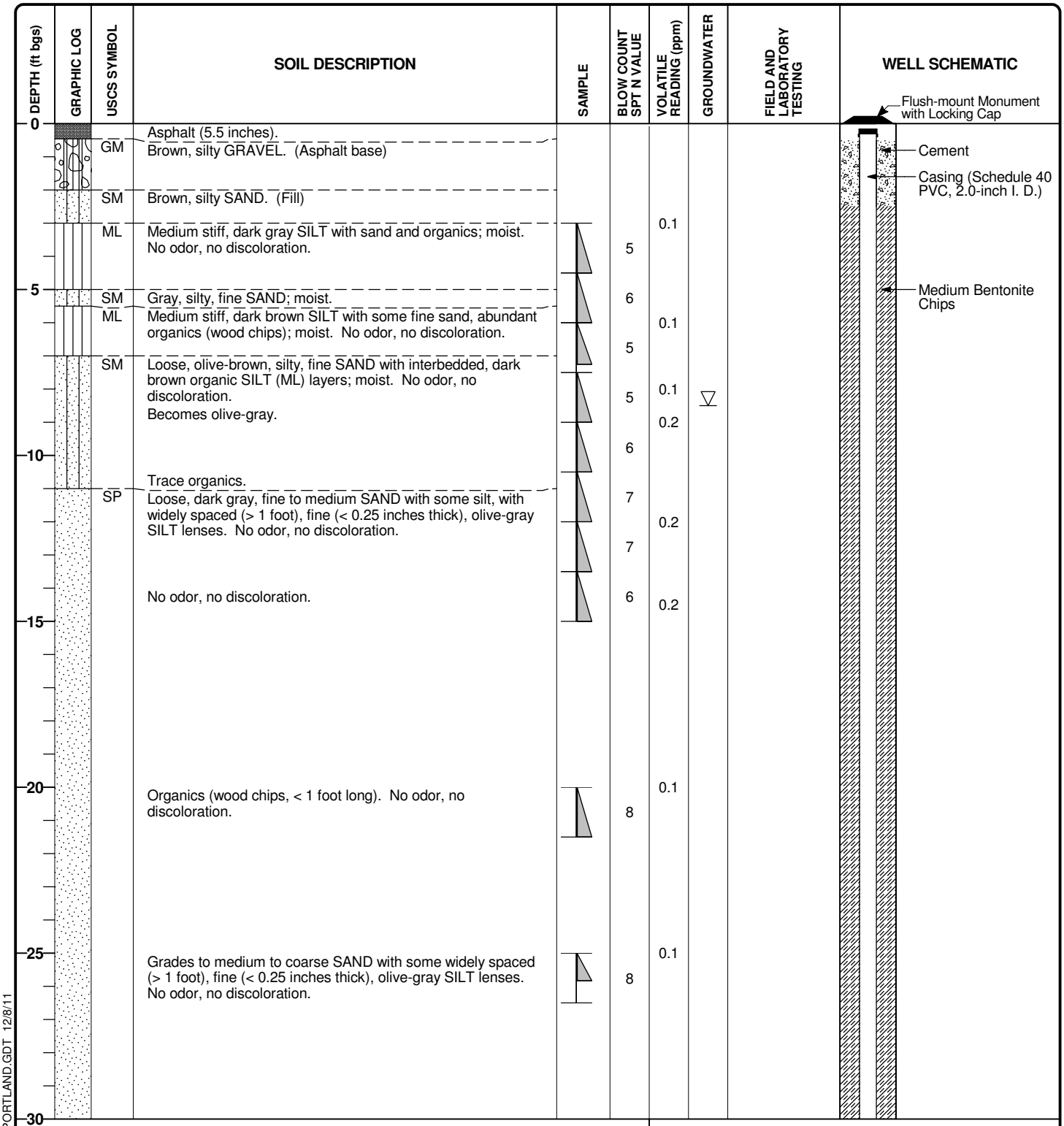
ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-49A



BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: /AAF684
DRILLING DATES: 9/16/2011 - 9/16/2011

REMARKS:

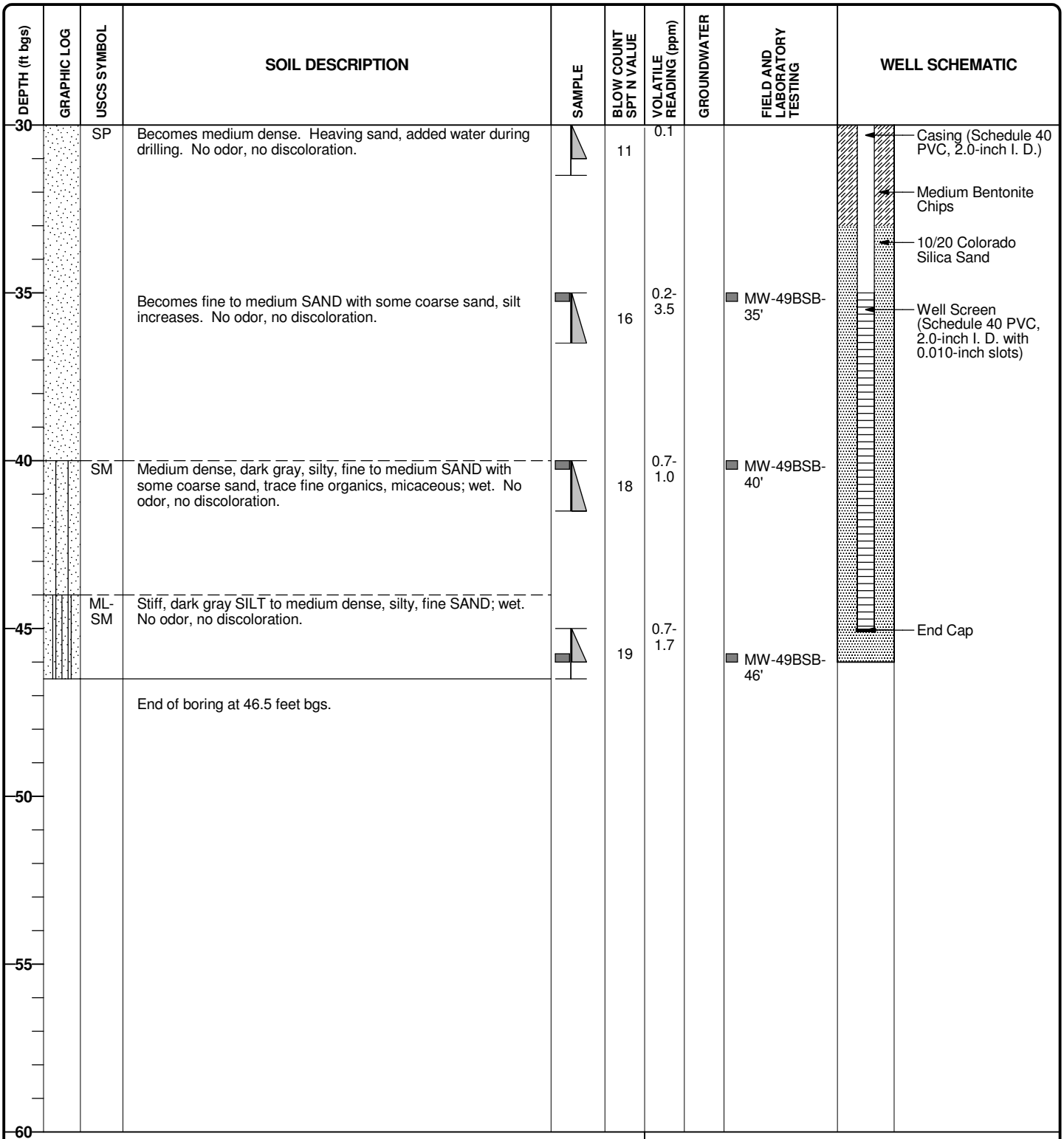
ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-49B



BORING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Hollow Stem Auger
CONTRACTOR: Cascade Drilling
LOGGED BY: A. Speransky

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: /AAF684
DRILLING DATES: 9/16/2011 - 9/16/2011

REMARKS:

ENVR+WELL BORING 9-915-14995L.GPJ AMEC PORTLAND.GDT 12/8/11

8801 Site

9-915-14995L

AMEC Environment and Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington
USA 98011
Tel (425) 368-1000
Fax (425) 368-1001

LOG OF BORING MW-49B

Attachment 3

Analytical Limits of Detection and Project Remediation Levels – Groundwater

Attachment 3 - Analytical Limits of Detection - Groundwater

Analyte	CAS	Analytical Resources, Inc. Method	MDL	RL[2]	Project Criteria Remediation Level	Cleanup Level
Metals						
Copper	7440-50-8	EPA 6010C	7.00E-04	2.00E-03	--	8
Polychlorinated Biphenyls (PCBs)						
PCB - Aroclor 1016	12674-11-2	8082A	2.48E-03	1.00E-02	--	0.000007*
PCB - Aroclor 1221	11104-28-2	8082A	2.48E-03	1.00E-02	--	0.000007*
PCB - Aroclor 1232	11141-16-5	8082A	2.48E-03	1.00E-02	--	0.000007*
PCB - Aroclor 1242	53469-21-9	8082A	2.48E-03	1.00E-02	--	0.000007*
PCB - Aroclor 1248	12672-29-6	8082A	2.48E-03	1.00E-02	--	0.000007*
PCB - Aroclor 1254	11097-69-1	8082A	2.48E-03	1.00E-02	--	0.000007*
PCB - Aroclor 1260	11096-82-5	8082A	2.76E-03	1.00E-02	--	0.000007*
Total PCB Congeners	--	1668C	2.00E-05	4.89E-05	--	--
Volatile Organic Compounds (VOCs)						
Benzene	71-43-2	8260C	3.00E-02	2.00E-01	--	--
1,1-Dichloroethylene	75-35-4	8260C	5.00E-02	2.00E-01	--	--
cis-1,2-Dichloroethylene	156-59-2	8260C	4.00E-02	2.00E-01	--	--
Ethylbenzene	100-41-4	8260C	4.00E-02	2.00E-01	--	--
Methyl tert-butyl ether (MTBE)	1634-04-4	8260C	7.00E-02	5.00E-01	--	--
Tetrachloroethene (PCE)	127-18-4	8260C	5.00E-02	2.00E-01		2.9
Toluene	108-88-3	8260C	4.00E-02	2.00E-01	--	--
Trichloroethene (TCE)	79-01-6	8260C	5.00E-02	2.00E-01	5/1[3]	0.7
Vinyl chloride	75-01-4	8260C	6.00E-02	2.00E-01	1/0.5[3]	0.18
m-Xylenes	179601-23-1	8260C	5.00E-02	4.00E-01	--	--
m,p-Xylenes	179601-23-1	8260C	5.00E-02	4.00E-01	--	--
o-Xylene	136777-61-2	8260C	3.00E-02	2.00E-01	--	--
Xylenes, Total	1330-20-7	8260C	9.00E-02	6.00E-01	--	--
Polycyclic Aromatic Hydrocarbons (PAHs)						
Acenaphthene	83-32-9	8270D	3.00E-01	1.00E+00	--	--
Acenaphthylene	208-96-8	8270D	3.00E-01	1.00E+00	--	--
Anthracene	120-12-7	8270D	3.00E-01	1.00E+00	--	--
Benzo(a)anthracene	56-55-3	8270D-SIM-LL	8.00E-04	1.00E-02	--	0.000016*
Benzo(b)fluoranthene	205-99-2	8270D-SIM-LL	5.00E-04	1.00E-02	--	0.000016*
Benzo(k)fluoranthene	207-08-9	8270D-SIM-LL	3.00E-03	1.00E-02	--	0.000016*
Total Benzofluoranthenes	E	8270D	8.00E-01	2.00E+00	--	--
Benzo(g,h,i)perylene	191-24-2	8270D	5.00E-01	1.00E+00	--	--
Benzo(a)pyrene	50-32-8	8270D-SIM-LL	2.00E-03	1.00E-02	--	0.000016*
Chrysene	218-01-9	8270D-SIM-LL	9.00E-04	1.00E-02	--	0.000016*
Dibenz(a,h)anthracene	53-70-3	8270D-SIM-LL	1.00E-03	1.00E-02	--	0.000016*
Dibenzofuran	132-64-9	8270D	3.00E-01	1.00E+00	--	--
Fluoranthene	206-44-0	8270D	4.00E-01	1.00E+00	--	--
Fluorene	86-73-7	8270D	3.00E-01	1.00E+00	--	--
Indeno(1,2,3-cd)pyrene	193-39-5	8270D-SIM-LL	1.00E-03	1.00E-02	--	0.000016*
Methyl isopropyl phenanthrene	483-65-8	--	--	--	--	--
1-Methylnaphthalene	90-12-0	8270D	3.00E-01	1.00E+00	--	--
2-Methylnaphthalene	91-57-6	8270D	2.00E-01	1.00E+00	--	--

Attachment 3 - Analytical Limits of Detection - Groundwater

Analyte	CAS	Analytical Resources, Inc.			Project Criteria	
		Method	MDL	RL[2]	Remediation Level	Cleanup Level
Naphthalene	91-20-3	8270D	2.00E-01	1.00E+00	--	--
Phenanthrene	85-01-8	8270D	2.00E-01	1.00E+00	--	--
Pyrene	129-00-0	8270D	3.00E-01	1.00E+00	--	--
Total Petroleum Hydrocarbon Compounds						
Gasoline	--	NWTPH-Gx	5.74E+01	2.50E+02	--	1,000
Diesel range organics	--	NWTPH-Dx	2.17E+01	1.00E+02	--	500
Heavy Oil	--	NWTPH-Dx	4.43E+01	2.00E+02	--	500

NOTES:

1 Laboratory reporting limits were compared to the most stringent groundwater preliminary cleanup level (PCUL) for nonpotable groundwater provided by Ecology (June 2018).

2 The RL represents the level of the lowest calibration standard; the RL may not always be achievable.

3 The remediation level for trichloroethylene and vinyl choride is dependent upon the on-site location.

* = based on total value rather than individual value.

Units are in micrograms per liter.

Analytical method selections may be modified to best meet objective of reaching screening levels.

-- = not available

CAS = Chemical Abstracts Service; Ecology PCUL = Ecology Preliminary Cleanup Level; MDL = method detection limit; NE = not established; NWTPH = Northwest Total Petroleum Hydrocarbons; RL - reporting limit; SIM = selected ion monitoring

Attachment 4

Analytical Limits of Detection – Soil

ATTACHMENT 4: ANALYTICAL LIMITS OF DETECTION AND PROJECT REMEDIATION LEVELS – SOIL

Attachment 4 - Analytical Limits of Detection - Soil

Analyte	CAS	Analytical Resources, Inc. Method	MDL	RL[2]	Project Criteria Remediation Level	Cleanup Level
Metals						
Arsenic (total)	7440-38-2	6010C	5.00E-04	5.00E+00	14.6	7.3
Barium	7440-39-3	6010C	7.00E-05	3.00E-01	--	--
Cadmium	7440-43-9	6010C	3.00E-05	2.00E-01	--	5.1
Chromium, total (or III)	7440-47-3	6010C	1.00E-04	5.00E-01	--	2,600
Chromium (VI)	18540-29-9	7196A	4.00E-01	4.00E-01	--	0.096/19
Copper	7440-50-8	6010C	7.00E-05	2.00E-01	3,200	36
Lead	7439-92-1	6010C	2.00E-04	2.00E+00	--	250
Mercury (elemental)	7439-97-6	7471B	5.25E-03	2.50E-02	--	--
Nickel	7440-02-0	6010C	3.00E-04	1.00E+00	--	--
Selenium	7782-49-2	6010C	5.00E-04	5.00E+00	--	--
Silver	7440-22-4	6010C	5.00E-05	3.00E-01	--	--
Zinc	7440-66-6	6010C	1.60E-01	1.00E+00	--	--
Dioxins/Furans						
Total Dioxins/Furans TEQ	--	1613B	2.33 E-6	1.0 E-6	--	5.20E-06
Polychlorinated Biphenyls (PCBs)						
PCB - Aroclor 1016	12674-11-2	8082A	8.00E-03	2.00E-02	--	--
PCB - Aroclor 1221	11104-28-2	8082A	8.00E-03	2.00E-02	--	--
PCB - Aroclor 1232	11141-16-5	8082A	8.00E-03	2.00E-02	--	--
PCB - Aroclor 1242	53469-21-9	8082A	8.00E-03	2.00E-02	--	--
PCB - Aroclor 1248	12672-29-6	8082A	8.00E-03	2.00E-02	--	--
PCB - Aroclor 1254	11097-69-1	8082A	8.00E-03	2.00E-02	--	--
PCB - Aroclor 1260	11096-82-5	8082A	8.00E-03	2.00E-02	--	--
Volatile Organic Compounds (VOCs)						
Benzene	71-43-2	8260C	3.00E-04	1.00E-03	--	--
1,1-Dichloroethylene	75-35-4	8260C	3.40E-04	1.00E-03	--	--
1,1-Dichloroethane	75-34-3	8260C	2.00E-03	1.00E-03	--	--
cis-1,2-Dichloroethylene	156-59-2	8260C	2.40E-04	1.00E-03	--	--
Ethylbenzene	100-41-4	8260C	2.00E-04	1.00E-03	--	--
Tetrachloroethene (PCE)	127-18-4	8260C	2.60E-04	1.00E-03	12	0.0016
Toluene	108-88-3	8260C	1.50E-04	1.00E-03	--	--
Trichloroethene (TCE)	79-01-6	8260C	2.10E-04	1.00E-03	12	0.001
Vinyl chloride	75-01-4	8260C	2.40E-04	1.00E-03	5	0.001
m-Xylenes	179601-23-1	8260C	3.90E-04	2.00E-03	--	--
p-Xylenes	179601-23-1	8260C	3.90E-04	2.00E-03	--	--
o-Xylene	136777-61-2	8260C	2.20E-04	1.00E-03	--	--
Xylenes, Total	1330-20-7	8260C	6.20E-04	2.00E-03	--	--

Attachment 4 - Analytical Limits of Detection - Soil

Analyte	CAS	Analytical Resources, Inc. Method	MDL	RL[2]	Project Criteria Remediation Level	Cleanup Level
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	83-32-9	8270D	5.10E-03	2.00E-02	--	--
Acenaphthylene	208-96-8	8270D	4.80E-03	2.00E-02	--	--
Anthracene	120-12-7	8270D	5.90E-03	2.00E-02	--	--
Benzo(a)anthracene	56-55-3	8270D-SIM-LL	7.00E-05	5.00E-04	--	--
Benzo(b)fluoranthene	205-99-2	8270D-SIM-LL	7.00E-05	5.00E-04	--	--
Benzo(k)fluoranthene	207-08-9	8270D-SIM-LL	1.00E-04	5.00E-04	--	--
Total Benzofluoranthenes	E	8270D	1.02E-02	4.00E-02	--	--
Benzo(g,h,i)perylene	191-24-2	8270D	5.80E-03	2.00E-02	--	--
Benzo(a)pyrene	50-32-8	8270D-SIM-LL	9.00E-05	5.00E-04	--	--
Chrysene	218-01-9	8270D	5.20E-03	2.00E-02	--	--
Dibenz(a,h)anthracene	53-70-3	8270D-SIM-LL	1.00E-04	5.00E-04	--	--
Dibenzofuran	132-64-9	8270D	4.60E-03	2.00E-02	--	--
Fluoranthene	206-44-0	8270D	4.50E-03	2.00E-02	--	--
Fluorene	86-73-7	8270D	5.00E-03	2.00E-02	--	--
Indeno(1,2,3-cd)pyrene	193-39-5	8270D-SIM-LL	9.00E-05	5.00E-04	--	--
Methyl isopropyl phenanthrene	483-65-8	--	--	--	--	--
1-Methylnaphthalene	90-12-0	8270D	6.00E-03	2.00E-02	--	--
2-Methylnaphthalene	91-57-6	8270D	5.70E-03	2.00E-02	--	--
Naphthalene	91-20-3	8270D	2.00E-04	1.00E-03	--	--
Phenanthrene	85-01-8	8270D	5.20E-03	2.00E-02	--	--
Pyrene	129-00-0	8270D	5.60E-03	2.00E-02	--	--
Total Petroleum Hydrocarbon Compounds						
Gasoline	--	NWTPH-Gx	2.50E+00	5.00E+00	250/1,000	250
Diesel range organics	--	NWTPH-Dx	2.50E+01	5.00E+01	--	--
Heavy Oil	--	NWTPH-Dx	5.00E+01	1.00E+02	4,000	2,000

NOTES:

1 Laboratory reporting limits were compared to the most stringent soil preliminary cleanup level (PCUL) for nonpotable groundwater provided by Ecology (June 2018).

2 The RL represents the level of the lowest calibration standard; the RL may not always be achievable.

Units are in milligrams per kilogram

Analytical method selections may be modified to best meet objective of reaching screening levels.

-- = not available

CAS = Chemical Abstracts Service; Ecology PCUL = Ecology Preliminary Cleanup Level; MDL = method detection limit; NE = not established; NWTPH = Northwest Total Petroleum Hydrocarbons; SIM = selected ion monitoring

ATTACHMENT 5: SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Attachment 5

Sample Containers, Preservatives, and Holding Times

Attachment 5 - Sample Containers, Preservatives, and Holding Times

Method	Analysis	Container[a] Type	Size	Preservation	Holding Time
Soil Samples					
EPA 8082A	PCB aroclors	Glass	8 oz.	Cool 0 - 6°C	14 days
EPA 200.8	Metals[b]	Glass	4 oz.	Cool 0 - 6°C	180 days
EPA 7471B	Mercury	Glass	4 oz.	Cool 0 - 6°C	28 days
EPA SM3500	Hexavalent Chromium	Glass	4 oz.	Cool 0 - 6°C	28 days
EPA 8270D	SVOCs	Glass	8 oz.	Cool 0 - 6°C	14 days
EPA 8260C	VOCs	Glass	8 oz./3 x 40 ml	MeOH(1); NaHSO4(2), Cool 0 - 6°C	14 days
NWTPH-G	TPH - Gasoline	Glass	8 oz./2 x 40 ml	MeOH, Cool 0 - 6°C	14 days
NWTPH-Dx	TPH - Diesel and Residual Range	Glass	8 oz.	Cool 0 - 6°C	14 days
9060A	Total Organic Carbon	Glass	4 oz.	Cool 0 - 6°C	14 days
Groundwater Samples					
EPA 200.8	Total Metals[b]	HDPE	500 mL	HNO3, Cool 0 - 6°C	180 days
EPA 7470A	Total Mercury	HDPE	500 mL	HNO3, Cool 0 - 6°C	28 days
EPA 200.8	Dissolved Metals[b]	HDPE	500 mL	HNO3, Cool 0 - 6°C	180 days
EPA 7470A	Dissolved Mercury	HDPE	500 mL	HNO3, Cool 0 - 6°C	28 days
EPA SM3500	Dissolved Hexavalent Chromium	Glass	250 mL	Cool 0 - 6°C[c]	28 days
EPA 8082A	PCB aroclors	Amber Glass	2 x 500 mL	Cool 0 - 6°C	7 days
EPA 8260C	VOCs	Glass Vial	3 x 40 mL	HCL, Cool 0 - 6°C	14 days
EPA 8270D	SVOCs/PAHs	Amber Glass	2 x 500 mL	Cool 0 - 6°C	7 days
NWTPH-G	TPH - Gasoline	Glass Vial	2 x 40 mL	HCL, Cool 0 - 6°C	14 days
NWTPH-Dx	TPH - Diesel and Residual Range	Amber Glass	2 x 500 mL	Cool 0 - 6°C	7 days
EPA 300.0	Nitrate, nitrite, sulfate	Glass	250 mL	Cool 0 - 6°C	24 hours
EPA SM4500	Sulfite	Glass	250 mL	EDTA, Cool 0 - 6°C	6 hours
EPA SM3500	Ferrous iron	Amber Glass	250 mL	HCL, Cool 0 - 6°C	24 hours
EPA 200.8	Manganese ion	HDPE	500 mL	HNO3, Cool 0 - 6°C	180 days
RSK-175	Methane	Glass Vial	2 x 40 mL	Cool 0 - 6°C	7 days

Attachment 5 - Sample Containers, Preservatives, and Holding Times

Method	Analysis	Container[a] Type	Size	Preservation	Holding Time
Soil Vapor Samples					
EPA TO-15	Aliphatics and Aromatics	Summa Canister	1 x 6 liter	None	30 days

NOTES:

a The size and number of containers may be modified by the analytical laboratories.

b Metals include arsenic, cadmium, chromium, cobalt, copper, lead, manganese, nickel, selenium, silver, and zinc.

c Dissolved metals and hexavalent chromium collected in unpreserved bottles. Upon receipt at lab, samples to be filtered and preserved.

°C = degrees Celsius; Dx = diesel-extended; EDTA = ethylenediaminetetraacetic acid; EPA = U.S. Environmental Protection Agency; G = gasoline; HCL = hydrochloric acid; HDPE = high density polyethylene; HNO3 = nitric acid; MeOH = methanol; mL = milliliters; NAHSO4 = sodium bisulfate; NaOH = sodium hydroxide; NWTPH = Northwest Total Petroleum Hydrocarbons; oz. = ounce; PAH = polycyclic aromatic hydrocarbons; PCB = polychlorinated biphenyls; SVOCs = semi-volatile organic compounds; TPH = total petroleum hydrocarbons; VOCs = volatile organic compounds